

Perceived Satisfaction by Customers in the Digital Printing Value System

Thomas Mejtoft*

Keywords: Customer value, Digital printing, Business strategy, Vertical integration

Abstract: Adding customer value to products and applications is important to be able to successfully compete using digital printing. In this study the perceived satisfaction of added value was explored. It was concluded that digital printing does not entirely fulfill the demands that customers have on their printed material, but it was indicated that digital printing will become more important for producing printed material in the future.

Among the critical success factors, time, quality, functionality/possibilities, and price, quality was the factor that customers deemed most important. This was also the factor that they were least satisfied with in relation to their needs. Time was the only factor that the customers were satisfied or more than satisfied with.

Based on the assumption that it is not possible to, realistically, have high demands on all critical success factors and that there has to be some tradeoff between them, the factors have been summarized and compared using mean-centered values.

Introduction

The printing industry in general is a fragmented business (Gilboa, 2002; Kipphan, 2001) with overcapacity, and printed material is regarded as a commodity product. This situation has forced the industry to compete primarily on the basis of price (Porter, 1980), and there have been continuous price reductions over time (Birkenshaw, 2004). Since the production cost in digital printing exceeds the cost for traditional printing technologies, the most successful strategy for digital printing is differentiation (e.g. Porter, 1980) because it is hard for digital printing houses to pursue cost leadership. This can be done by engaging in backward integration and helping customers to create material suitable for digital printing, that is for example variable productions and short runs. Higher customer value can also be achieved by forward integration and reducing costs for distributions, stock keeping and lowering the discarded volume (Mejtoft, 2006).

* STFI-Packforsk/Royal Institute of Technology (KTH), Sweden

As vertical integration (e.g. Harrigan, 1984, 1985; Porter, 1985) is becoming an important factor for succeeding in digital printing, the services that traditionally have been carried out by advertising agencies and prepress companies are developing into an incorporated service that the integrated digital printing houses are offering. The integrated digital printing house is here defined as a company that can provide services, to different extents, along the greater part of the value system and is therefore vertically integrated to a high degree. The further away from the core business the vertical integration goes, the less likely it is to succeed (Peyrefitte et al., 2002). Digital printing houses often have the greatest capacity in the business unit that they originate from.

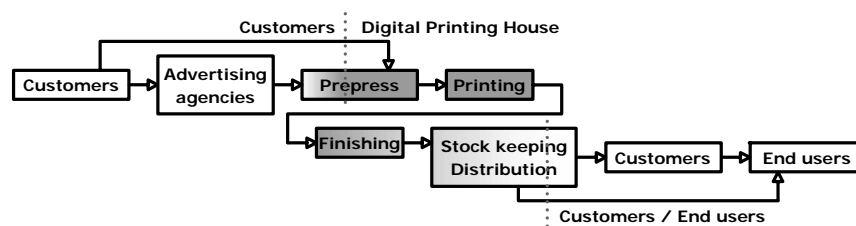


Figure 1. The value system for the digital printing industry (After Mejtoft, 2006).

Differentiation as a strategy often comes from a customer-centered approach where the customers' needs are in focus when creating the appropriate services and activities (Day & Wensley, 1988). This implies the importance of investigating how customers in the value system (Figure 1) experience the situation and identifies the sources of customer value (Roos & von Krogh, 1996). In this paper, the term value system is used for the whole industry instead of the value chain to capture the width and multiplicity of different relationships in business markets. Two types of important customers to an ordinary digital printing house are advertising agencies and direct customers. A direct customer is an end customer of the printed matter that chooses to bypass the advertising agencies and purchase the services directly from the digital printing house.

Objective of the study

The objective of this paper is to study how customers in the digital printing value system experience the value received from digital printing. This study focuses on customers that have made the transition from traditional printing production to digital printing production and how internal and external changes have been carried out to profit from the advantages of digital printing.

Theory

Porter (1985, p. 130) declares that a company working with differentiation as a strategy must be able to "create competitive advantages for its buyers". Differentiation cannot be successful unless it somehow raises the perceived

value for the customer. Since the purchased product is to be incorporated into the value chain of the customer, it is important that a product can either lower costs for the customers' value chain or raise the revenues.

Since the cost for the actual printing process in digital printing is higher for longer runs, than it is for traditional printing technologies, the lowered cost must come from either decreasing the volume of the printed material or from decreasing the cost in other steps. This cost reduction can be in either the internal value chain of the printing company or the value chain for ordering, handling and using printed material at the customer level. Increased revenues are possible to achieve with digital printing by using one-to-one marketing (Peppers & Rogers, 1993) to customize advertisements to end consumers, which increases the response rate. One-to-one marketing is when a company does not strive to gain the biggest market share, but concentrates on building sustainable long-term relationships with their most important customers. Broudy & Romano (1999) showed that just by using simple personalization (full color prints and adding the name of the receiver) the response rate increased by 135% over black and white static mailing. Moreover, by using database information to customize offers to consumers, the response rate increased over 500%.

Earlier studies show the importance for printing houses to gain customer contact by integration in order to educate the customers and increase the number of jobs suitable for digital printing (Mejtoft, 2006). General research in vertical integration shows advantages like avoiding time-consuming tasks when improving coordination between activities and assuring supply (Harrigan, 1984), but also implies possible disadvantages such as increased internal cost and high exit barriers as the distribution of profits and cost in the value system becomes unclear (D'Aveni & Ravenscraft, 1994; Gadiesh & Gilbert, 1998; Harrigan, 1985). However, vertical integration is a way for new products to penetrate a mature market since it is possible to show the product's superiority (Harrigan, 1985). There has been an endless discussion on how new technology changes the rules of competition (e.g. Carr, 2003; Porter, 2001; Stewart, 2003). Digital printing has changed the cost- and profit pools of the print media value system. This has made it important for both digital printing houses and customers to change their behavior to be able to profit from the new technology. Both the introduction of new technology and consequently the changes in strategy have affected the way digital printing houses approach their customers.

Purchasing orientation

The bargaining power of customers is one of the five forces in the five forces framework, constructed by Porter (1980). The customers are most likely powerful when the sellers' industry consists of many small actors, the products are considered a commodity and switching costs are low. This is the state of the printing industry in general today. Information is also an important factor for

bargaining power. If the customer has more information about products, prices, quality etc., the bargaining power of the customer increases.

Purchasing is the process where a company acquires different resources from other companies. The customers of a digital printing house consist to a majority of companies that are going to use the printed matter for information or marketing. Purchasing is a broad concept that can be divided into three orientations dependent on how broad the purchasing orientation is - *buying*, *procurement* and *supply management* (Anderson & Narus, 2004; Dobler & Burt, 1996).

The buying orientation is when a customer strives for the best deal in terms of minimizing the price of a product and maximizing quality and availability. In a fragmented, commoditized and over established market like the printing industry, the buyers' power is high. Procurement is when the customer focuses on improving quality by cooperating with the supplier and reducing the total cost, and not just the price, of a product or service. With supply management the goal is to obtain the greatest total value of a product or service. This is achieved by integrated cooperation with suppliers to build supply networks that complete whole business processes (Anderson & Narus, 2004).

Hypercompetition

In many industries, it is not possible to solely compete on terms of cost leadership, differentiation or focus (Porter, 1980). Earlier studies of the digital printing industry point out differentiation as a way to compete with the technology in the printing industry (Mejtoft, 2006). One problem is however that the industry suffers from a widespread overcapacity, which has lead to severe price competition (Birkenshaw, 2004). When acting in this kind of environment the concept of hypercompetition occurs (D'Aveni, 1994). When hypercompetition occurs it gets hard to create the sustainable advantages Porter (1980, 1985) describes. In this environment, the goal is not to achieve sustainable competitive advantages by using a strategy of differentiation but to use this strategy to disrupt the stationary state and create a continuous series of competitive advantages without waiting for competitors to undermine those already achieved (D'Aveni, 1994, 1995a).

Michael Porter's (1985) theory of competitive strategy states that the sustainability of differentiation depends on continued perceived customer value and lack of imitation from competitors. Since the service most certainly will be copied when acting in a hypercompetitive market, working with customer value will be very important because "*the process of developing new advantages or undermining those of competitors begins with an understanding of how to satisfy customers*" (D'Aveni, 1995b, p. 240).

Buying from a differentiated supplier will increase switching costs for the customer (Porter, 1985), which will reduce the customers' willingness to change suppliers, even if other companies create similar services. However, one of the major corner stones of hypercompetitive theory states the importance of speed and surprise to create and react quickly to opportunities in the industry environment (D'Aveni, 1995b).

If hypercompetition is a "self-inflicted wound" (Porter, 1996) or something that eventually happens in almost every industry as an inevitable outcome (D'Aveni, 1994) is a debated area. It is apparent that the dynamics of competition have changed and become faster, more intense and the available time to enjoy each competitive advantage has become shorter (Wiggins & Ruefli, 2005).

Critical success factors

For a producing company to be successful in a changeable industry environment, they have to consider the critical success factors (CSF) - cost, quality and time (Blocher et al., 1999). Cooper (1995) introduces the role of the survival triplet – cost, quality, and functionality, which is crucial for survival using a confrontation strategy. A company must compete effectively in all these three to succeed.

Cost, Time, Functionality, and Quality, are all factors that are important when purchasing printed matter and, as described earlier, they differ between digital and traditional printing. Therefore, these CSFs will be considered in this study. Since the factors are studied externally from the customer's point of view, the term *Price* will be used instead of cost to be consistent with Cooper (1995). Accordingly, the functionality of the technology is also the possibility for the customer to use the printing technology to order unique products. The factor *Functionality/Possibilities* has thus been used.

Customer Value

Customer value is something that is stated and experienced by the customer, but product value is created along and in every step of the value system. This implies the importance of thorough market analysis or a good relationship with customers (Svensson, 2003). This is also something that the integrated digital printing houses are becoming better at, as they move closer to customers and end users in the value system.

The kind of printed material a customer orders from a printing house differs, but in general printed material has an informative or marketing function. In marketing a company often adopts a channel mix of for instance printed material, e-mail, Internet and tele-marketing (Kotler et al., 2005). This means that several marketing channels often compete for the same budget.

As mentioned before it is important to deliver perceived customer value. Customizing offers is one important way to do this. This kind of mass customization has become more common with new technology (e.g. powerful computer systems and detailed databases) (Kotler et al., 2005; Peppers & Rogers, 2000), even though there are still doubts about what the technology actually can achieve (e.g. Kuchinskas, 2000).

There are many similarities between the Internet and digital printing as channels. The outputs of both have the advantage of being easy to differentiate, customize, and personalize. By using the Internet as an interface of digital printing, web-to-print, it is possible to move from customization to customerization (Gennard et al., 2000). This is when a customer takes a more active roll in the creation and production of the final product or service (Kotler, 2005). The complexity and how customers perceive their added value are different between the applications mentioned above. While print-on-demand is easy to use it gives a low customer value and complex variable data printing gives a higher customer value.

The Internet has an advantage over digital printing, as the cost of distribution over the Internet is very low. Internet has during the last ten years become an important channel for companies to sell and supply information about their products and services (Friedman & Furey, 1999). In general, when discussing the potential of the Internet the predominant literature takes its starting point in concepts like richness and reach in terms of technological possibilities (e.g. Evans & Wurster, 2000).

It is, however, still important to remember the fundamentals of strategy. One of the most fundamental virtues of strategy is that of value creation. If a company cannot provide a value that someone outside the company is willing to pay for, the company will inevitably go bankrupt. As seen here the Internet is both a competitor and a necessity for digital printing houses today.

Methodology

In this qualitative study, focused interviews have been conducted to gain deeper knowledge of the behavior behind the strategy used in the studied case companies (Bell, 1999; Saunders et al., 2000; Robson, 2002). An approach inspired by Grounded Theory (Glaser & Strauss, 1967; Goulding, 2002; Gustavsson, 1998) has been used, as this method is suitable for understanding how customers experience a situation and to find new phenomenon. All case studies have been conducted in parallel, then the material has been coded and conceptual constructs have been formed. Also a literature study has been carried through to compare the results with findings in the literature. In Grounded Theory the idea is to partake of the literature after the empirical study has been conducted to be as uninfluenced as possible and increase the chance of new findings and insights. However the opinions are divided about this approach to

the literature (Glaser & Strauss, 1967; Goulding, 2002; Gustavsson, 1998) and initial theoretical knowledge may be vital to enhance the theoretical sensitivity. In this study, literature reviews were conducted both before and after the empirical studies where carried out.

The interviews have been carried out with respondents from a selected number of customers to digital printing houses in Sweden. The interviews were all conducted either at the customer's company or at a place of their choice during the late spring of 2005. They were held under calm conditions without time pressure (Bell, 1999). Additional information has been collected from annual financial reports and websites of the companies in the study.

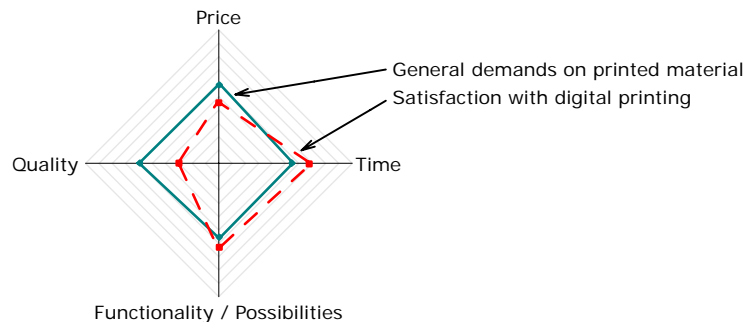


Figure 2. A model of the critical success factors - price, time, functionality, and quality.

During the interviews, a short survey was conducted. In the questionnaire, the respondents were requested to grade from 1 (low) to 10 (high) their general demands on printed material and their satisfaction with digital printing according to the critical success factors (CSF) price, time, functionality/possibilities, and quality. To be able to easily compare the satisfaction in relation to the demands between the respondents, the sum of the demands has been mean-centered. This implies that by using an average mean centered value of the results from the survey, the result from all respondents add up to a total of 22. However, their satisfaction level does not necessarily add up to the same sum, but to a value that is proportional to their actual level of satisfaction compared to their demands. The CSFs have been presented in graphs and there they represent two areas that show their demand on printed material and satisfaction with digital printing (Figure 2). In addition to these calculations a score point has been calculated for each CSF to establish how the CSFs are ranked among each other by each customer company. The least important CSF has been given a score of 1 and the second least a score of 2 etc. If two or more CSFs have the same rank each of them has been given an average of the summarized scores.

Besides the questionnaires during the personal interviews, additional data has been collected, by telephone and Internet, from other companies that have not been personally interviewed.

Choice of companies and respondents

Previous research shows that vertically integrated digital printing houses are trying to increase their share of direct customers. This is because it is possible to influence customers to order printed material better suited for digital printing, by providing greater parts of the value system for print media (Mejtoft, 2006).

For digital printing houses the major part of the customer base still consists of advertising agencies. But since the shares of direct customers are increasing, companies for this case study have been selected to represent both professional customers, i.e. advertising agencies, and non-professional customers, i.e. direct customers, to digital printing houses. In total 12 customer companies have participated in the survey study of which 8 have been interviewed. In the calculated averages all 12 companies have been included. The respondents interviewed were persons responsible for purchasing digital printing, which is in most cases were project managers at the customer companies.

Results of the case studies

This chapter contains a descriptive summary of the 8 individual customer companies interviewed in this study. Results from the survey, of all 12 customers in the study, have been presented as graphs in Appendix 1. The analysis of the case studies is presented below under "*Discussion*".

Customer 1

Customer 1 is a small advertising agency that works in a network with other agencies. They try to build long-term relations with the printing houses they work with and today they use approximately ten different printing houses, some are integrated printing houses and some are printing houses focused on the printing SBU. For Customer 1 price is a less important factor in general, but an increase in or high price can be an incentive to change the base of printing houses they currently work with. Customer 1 uses different printing houses depending on the special need for a job, if the current job demands special finishing or distribution they choose a printing house that can handle every step needed. When they deliver a job to a printing house it is in the form of a print ready digital document.

Today the volume of digital printing is under half of the total volume, because digital printing is most cost effective in short runs. They strive towards doing more variable data job but it is hard to sell a variable data job to the end users.

The opinion of Customer 1 is that the digital printing houses are not adept at marketing digital printing towards their customers and believes this to be a major reason for the low volumes.

In the beginning reduced costs for smaller editions and the need for shorter runs were the biggest incentive to start ordering digital printed material. Even today it is mostly the ability to produce short runs that has increased value for Customer 1. Digital printing has given them the opportunity to promise shorter deadlines to their clients and take on jobs that are time critical. It has changed the strategy for Customer 1 to work with time as another variable. Unfortunately it is not possible to obtain any sustainable competitive advantages of this aspect since all competitors have the same opportunity and it is a considerable risk that *“one spoils the customer, and they get used to short [delivery] times”*. It is difficult to get paid for increased value, and for Customer 1 the pricing is more focused on the lifecycle of a customer relation than a single project.

As Customer 1 believes that quality is an important argument when selling their products, digital printing has a substantial disadvantage since they believe that the quality is poor and below their expectations. They also consider it important to know about the different types of printing technologies in the family of digital printing. Digital printing consists of several different printing technologies and the different technologies give quite different results quality wise. According to Customer 1, this makes it harder to be a customer since the digital printing house has an advantage over the customer, with its greater knowledge about how to use the different technologies for the best result.

“Earlier the advertising agencies had an increase in the price of print of about 25%, this increase does not exist any more.” They feel that the printing houses are working towards increasing the share of direct customers. This is to increase revenues but also to cut steps in the value system and speed up the process. Despite this, the advertising agencies believe that the printing houses appreciate them because the material delivered to the printing house is better thanks to the professional knowledge of an advertising agency in contrast to the direct customer.

More and more of Customer 1's production is digitally printed, this is a development that they believe is going to continue, *“digital printing is not a hype that will go away, it will develop and become more and more common.”* But the price of digital print must decrease and the quality must increase.

Customer 2

Customer 2 is a large international industrial group. In this study the focus has been on their instruction manual production. They are in a process of transition from producing standard instruction manuals for all individual products in a

series to produce individual customized instruction manuals for every single product delivered from their factories. Today Customer 2 is the only one among their competitors to produce a customized instruction manual to this extent.

They use several printing houses for all printing production in the industrial group, but for the instruction manual they use only one integrated printing house that can handle both prepress and the finishing. As a part of a long-term contract, the printing house has invested in the development of a production system to suit Customer 2's needs and the price of each instruction manual is set accordingly. All compilation of the customized manuals is then performed at the printing house in their system. The instruction manual is a part of the whole instruction handbook that is delivered with the finished product. The composing of this handbook is performed at the same printing house that prints the customized manual.

For Customer 2 it is a question of outsourcing, as the instruction manual produced is regarded as a component of the finished product. This decision has been made not only by comparing the lowest cost but also considering service and quality. The idea to start using digital printing was by an initiative from Customer 2, and the main reason was to increase customer value by customization of the product and in the long run reduce the cost for production. With print on demand they experience a cost reduction by avoiding stock keeping and discarding of preprinted parts of the instruction manual.

The quality expectations were higher than the results delivered on the finished products. This was probably due to the fact that the printing house promised higher quality than they were able to deliver without raising the price of the finished product. The quality also varies between single copies of the manual. There have been a lot of general problems in the start up phase but they believe that the printing house has supported them in a constructive way. Among other things it has been necessary to perform many random inspections so the wrong manual will not be delivered with a finished product.

As mentioned before, the main goal was to increase customer value by only providing the needed information in the customized instruction manual. It was also important to increase the value and simplicity for internal employees when constructing manuals. They have conducted some interviews with users of the instruction manual to find out how the end users perceive the customer value. Today they believe that their product is more technically advanced thanks to customization than just by having a nice layout and good quality. However, these are factors they are also working with now.

They have a strict cost restriction on the finished manual, but the goal is to increase both quality and functionality further. Customer 2 wants to change from grayscale to color printing, which may be possible in the future since the prices

on digital print are decreasing. The long-term aim in the future is to integrate the “instruction manual” as a part of the product and create a self-explaining product. This would mean that they could avoid the printing step completely.

Customer 3

Customer 3 is a Swedish government agency that produces large quantities of printed material in the form of e.g. reports. They have recently started an internal project that aims at storing and distributing their reports as digital documents. The goal is that only the most important reports should be printed in larger quantities and all others should be printed on-demand with digital printing. Before the transition project started just below half of the production was digital printing, this part will increase when they stop the excess-production of printed material. In regards to the number of orders, approximately eight out of ten is an order for digital printing.

Today over 200 writers in the organization can decide for themselves what should be printed, the size of edition and how the distribution stock keeping should be handled. However, by utilizing digital printing and limiting the authority to order printed material to just a few persons, the internal situation should be easier to control. These persons will have greater knowledge of how to order and handle printing production.

This customer has been working with their current printing house for approximately two years and they reduced their costs for printed material by 40% when they changed their supplier of printed material. Price and time were two important factors when the contracts were signed with their current printing house, with the price as the most important. They also placed high ethical and environmental demands on their supplier of printed material. The printing house they are working with has sub-contractors for different kinds of print and the printing house is responsible for the latter steps in the value system.

The initiative came from Customer 3, they wanted to have print-on-demand and “*wanted to save time, money and trees, ... so it is obvious we are moving towards [using] more digital printing.*” They believe that the support from their printing house is good and the printing house has arranged seminars and help-sessions to ease the transition into using digital printing and print-on-demand. The printing house actually has several employees located at Customer 3 to act as a gateway for orders and support. “*This is the only way the printing house can handle this, otherwise, impossible ordering situation*”. In the contract with the printing house there are specifications about lead times and economic compensation when those are not met.

Customer 3 believes that the use of digital publications and distribution is a very cost-effective way of working. When working with digital publications, digital

printing is the natural way of output since time will be an important factor if a publication is needed in printed form. The new way of working will increase the value for Customer 3 by decreasing storage volumes, and consequently the amount of discard volumes. But also, since fewer publications will be printed, the content quality of what is printed will increase.

Customer 3 does not believe that lack of having printed material in stock will be a large problem since most of the stocks are non-moving. The major step is to get the co-workers to realize the advantages with avoiding stock keeping of their publications. The lack of use of different paper grades and finishing is a disadvantage for digital printing in the co-workers opinion.

Employees at Customer 3 have expressed positive response to the idea of customized information and publication on their intranet. When the transition project has been carried through, they will look into the possibility of customizing their publications.

Customer 4

Customer 4 is a large international industry company with dealers all over the world. Their Nordic division serves approximately 150 dealers in the Nordic countries. The greater part of their printing production is advertising material produced with traditional printing technology.

Customer 4 is now in an introduction and test phase of introducing the web-to-print solution to their dealers. This is done in cooperation with a printing house they have been working with for about two years. With this system, Customer 4 wants to move away from mass customization into a more active involvement from their end users side. This will both minimize the work for Customer 4 and help the end users to receive the material they need.

When ordering other traditionally printed material in larger volumes, they usually purchase every step in the value system separately and handle all contacts with the sub-contractors. However, for the digital printed material the digital printing house handles everything from printing to distribution and invoicing for the dealers. This means that they do not need to take any part in this chain or have any more costs once the corporate profile has been applied and templates have been created in the web-to-print system.

Their aim when they started to utilize digital printing was both control over templates and increased service to their dealers. Simplicity is what Customer 4 believes is the greatest value they experience. Earlier every dealer had to produce their own business card, letter papers and envelopes according to Customer 4's corporate profile, with varying results. Today they can, for those

dealers that order through the web-to-print application, control templates so business card, letter paper and envelopes look the same for all dealers.

By contracting a digital printing house that already had a web-to-print application developed, they believed that the introduction of the system would be quick. They also hoped the price would be on such a moderate level that the dealers would use the system. They have no guarantees regarding lead times, but the distribution works well with delivery within two days from ordering.

There have been technical problems with the web-to-print application. Customer 4 believes that the digital printing house exaggerated how far they had come in the development of their system. This has produced a certain level of frustration when they have not been able to increase the use of the application further. They believe that the problems with the application have been an annoying factor that has reduced their ability to spread the application to their dealers.

Another problem is that the general computer knowledge among the dealers is low and varying, this makes it harder to introduce a web-to-print system. As the dealers are the ones that pay for the ordered material and Customer 4 is worried that this new system has raised the cost for the printed items in comparison with ordering at a local printing house as done before.

Today they produce business cards, letter paper and envelopes in the application. The goal is to increase the number of items possible to order in the system. Even other parts of their printed production may be produced with digital printing in the future, e.g. after sales contact. But if another digital printing house would present a better solution, they are not unwilling to switch suppliers.

Customer 5

Customer 5 is a large group of companies active in the clothing and gifts industry. They have an internal division consisting of 15 persons working with advertising and they have had this division for over ten years. The main goal with the in-house division is to avoid using advertising agencies, this is a way of reducing costs both of the original production and the purchasing of printing as they are working with about seven different printing houses.

They mostly produce advertising material for the business market, but also some to the consumer market. By producing their own advertising material they believe that they get added value by getting closer to their products and customers.

The main reason for the initial use of digital printing was to reduce the costs of small series. The ability to customize has since then become another driving force, since they wanted to change e.g. addresses and logos for their retailers.

They have in-house competence for variable data production and create the job before delivering it to the digital printing house. They work with printing houses that are also able to handle finishing and distribution in-house.

Quality is an important factor in general for Customer 5, but they did not have any big expectations on the quality of digital printing and they are not fully satisfied even though the quality has become better over time. They believe that different printing houses deliver very dissimilar quality of digital print. To be able to purchase digital printing successfully Customer 5 believes that it is important to realize that there are limitations with the quality. Their main supplier of digital print has helped them to increase their knowledge about the limits and possibilities of digital printing.

Digital printing has reduced Customer 5's lead times and lowered their costs. The lowered cost mainly comes from other steps in the value system, like reduced distribution cost when they can pre-sort the mail items.

Digital printing has not changed the way they work except for the above mentioned and they have not yet created any more advanced variable data campaigns. They believe that in the future they will need faster delivery times. For Customer 5 to increase their use of digital printing, the quality must improve.

Customer 6

Customer 6 is an advertising agency that started out about five years ago and is specialized on marketing strategy. Since their start, they have had collaboration with a local printing house that prints about 90% of their printing today and most of this production is produced using digital printing. They try to sell concepts around communication and with cross channel publishing, printing is just one possibility to output information or messages among many others channels like web and mail.

Since they are a relatively new agency, digital printing has always been an interesting technology. The concept of one-to-one marketing was the reason why digital printing became an alternative for Customer 6 to produce customized printed material. They believe it was a symbiosis with their printing house that influenced them to start with digital printing.

Even though there is a fierce price competition on the printing market, Customer 6 has chosen to work with just one printing house and with a collaboration built on mutual respect and understanding for each others costs. Customer 6 believes that the collaboration with the printing house instead of a buying situation is an important basis to run a successful business. This collaboration gives them a continuous dialogue, and helps Customer 6 produce efficient campaigns for their clients.

“If one wants to succeed it is important to work with added value [for the customer]”, and they use digital printing as a way to increase their clients’ value. They want their clients to work with media that has a high-end customer value but at the same time is cost efficient. This is done by working with cost per potential customer and not cost per reached customer when they are spreading a market message with the aim to sell.

The major disadvantage with digital printing is that the quality, colors and durability is not as good as expected and does not reach the demands of Customer 6. *“The small differences [in quality and colors] may lower the status of digital printing just because one compare with offset”*, this makes it important to work differently with digital printing than with offset to increase the customer value. Customer 6 believes that it is very important to have knowledge about the marketing message since one-to-one marketing is an important way of taking advantage of the technology.

Customer 7

Customer 7 is an industry group that has a wide range of customers all over the world. They produce, both marketing material and instruction manuals, mainly at their factory in Sweden and it is printed at a local printing house. They have a more than 10 year long relation with their current printing house, from which they order a mix of offset and digital print. One reason why they chose to collaborate with this printing house is that they offer an online web shop, in which Customer 7 easily can order printed material.

They deliver both print ready digital documents and digital documents where the printing house performs the prepress work. But as they order an item in the web shop the printing house handles all the latter steps in the value system, e.g. finishing and distribution to end user. Customer 7 has a tight relation with their printing house since they have a long tradition of working together and the printing house is handling the web shop and the image database for customer 7. The use of a vertically integrated printing house was important when choosing to continue their collaboration with their current printing house. Customer 7 believes that the local nearness of the printing house is an advantage compared with other printing houses that are not represented in the region. It is important that the printing house has a high level of competence in their field, which their current printing house has in most areas.

Need for on-demand printing to reduce stock keeping and discarded volume was one factor to start printing their material with digital printing and this is also their perceived value today. The volumes of the editions also decreased, which made it more advantageous to print with digital printing versus offset. Reduced levels of discarded volumes are the greatest cost saving up to date. Digital

printing in collaboration with the web shop has made it easier to order small series and make direct marketing campaigns.

Due to print-on-demand, Customer 7 has high demands on the printing house to develop lead times and quality. They have guarantees from the printing house that assures certain delivery times and the web shop makes it easy to follow the internal workflow in the printing house. It is important to follow the technological development to know what can, realistically, be demanded of the printing house.

In general the quality is an important issue and more specifically the color management, this is because Customer 7 wants their logotype to be reproduced with the right shade of colors. Thanks to discussions with the printing house the quality has increased, but it is still not as good as they hoped. For Customer 7 the selection of paper is important, and they do not believe that digital printing can handle the paper that they require for their needs.

In the future Customer 7 wants to be able to handle more one-to-one communication with their customers. They also want to decrease the printed material and increase the use of digital documents, in order to decrease lead times, and increase flexibility and accessibility even further than digital printing allows. The use of digital documents on the Internet is today both a competitor and a compliment to the printed material.

Customer 8

Customer 8 is a rather large advertising agency working mainly with Internet and printed material. Today they work frequently with approximately four different printing houses to which they deliver print ready digital documents. If their clients want to choose a printing house of their own, the client is responsible for that production. However, if Customer 8 should handle the purchasing of the printing step in the value system, they take responsibility, but they also increase the price by 10%. Approximately 10-15% of their current production is produced with digital printing technology today.

Customer 8 believes that they have control over the transition to digital printing and it is basically the demand for shorter lead-times and smaller volumes that has been the driving force. Although the jobs that are digitally printed are increasing, the number of variable data productions are limited to just a few per year. They believe that it is hard to sell more advanced variable data productions, since the market is undeveloped. Another problem with digital printing is that it is more expensive and the quality is poorer compared to traditional printing.

Digital printing and the Internet are competitors and as the cost for the clients are becoming more and more important the question “*are we going to do it as an electronic campaign or are we going to do a printed campaign?*” arises. As Customer 8 is not dependent on the output channel, their main concern is to make great campaigns for their clients and not to print for the sake of printing.

They do not believe that they, all the time, have the full knowledge to decide the suitable way of producing printed material, but they believe that contact with colleagues and printing houses are valuable to decide the best and most efficient production method. Long-term relations to printing houses are therefore valuable even though it is not good to get too dependent on one printing house. “*I am just a buyer, I do not care how they print it.*”

As lead times are becoming shorter, digital printing is becoming more important to be able to keep deadlines. Currently they are not actively helping their clients to reduce the printed volume, they even suggest that they “*order a little extra, you know you will need it*”. If prices for digital printing decrease and if it becomes economical to print larger volumes, Customer 8 would most certainly increase their share of digital printing.

Discussion

Purchasing orientation

Both advertising agencies and direct customers strive towards having a long-term relation with their digital printing houses. The direct customers were more interested in procurement or supply management than the advertising agencies, and this is consistent with previous research that shows that vertical integrated digital printing houses strive towards increasing their share of direct customers. This has its basis in the fact that the knowledge among advertising agencies of handling every step in the digital printing values system is higher than for the direct customers. It may also be possible to lower the cost by separately buying every single service.

Engaging in digital printing.

This study indicates that the main reason for starting to use digital printing was print-on-demand, that is the need for shorter editions, to shorten lead times and to reduce stock keeping. The need for variable data was a more uncommon reason for starting to use digital printing. But over time variable data printing has, even though slowly, attracted the attention of the customers. And today several of the customers feel that they benefit from different kind of variable data printing, but mostly simple variable jobs. The study also indicates that the need for variable data printing will increase in the future.

Critical success factors

Both categories of customers were not fully satisfied with digital printing as a service for their printed material when examining the critical success factors (CSF) - Price, Time, Functionality/Possibilities, and Quality. When studying the average value of the CSFs measured in the survey, it is possible to discern that the general demands from advertising agencies were higher than from the direct customers (Figure 3). And the advertising agencies were also much more dissatisfied with digital printing in comparison with their demand.

The ultimate purchase as a customer is to receive high quality and functionality, with short lead-times and at a low cost. The method of mean centering is based on the assumption that it is not possible, realistically, to have a high demand on every factor, there has to be some tradeoff between them. Just as the theory describes, the implications of these CSF change over time but under all normal conditions, including a hypercompetitive scenario, increased functionality, quality or lowered lead-times results in the opportunity for the producer to charge a higher price for the product or service.

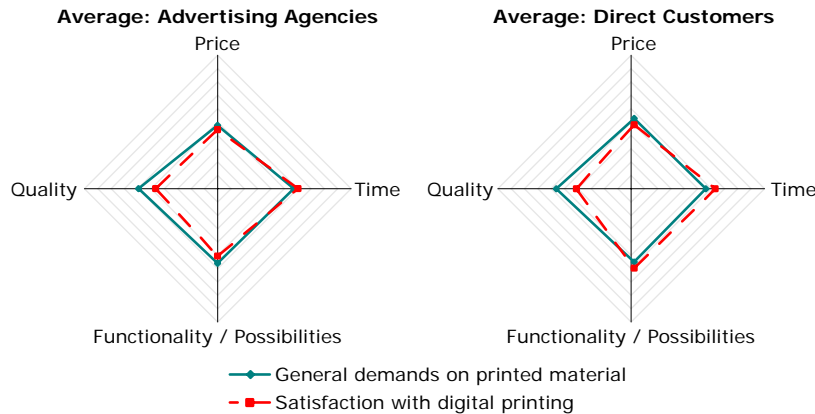


Figure 3. Mean-centered average demands on printed material and satisfaction of digital printing for advertising agencies and direct customers.

There was a slight difference in how the four different CSFs were ranked among each other between advertising agencies and direct customers for their general demands. Both customer categories ranked quality as their main need and price as a less important factor regarding printed material. Advertising agencies ranked time and functionality as nearly as important as quality while direct customers ranked these CSFs more or nearly as unimportant as the price aspect (Table 1).

Table 1. Ranking of CSFs for the demand on printed material, score point in parenthesis.

	Time	Quality	Functionality	Price
Advertising agencies	2 (2.75)	1 (3.08)	2 (2.75)	4 (1.42)
Direct customers	4 (2.25)	1 (3.00)	3 (2.33)	2 (2.42)
All customers	3 (2.50)	1 (3.04)	2 (2.54)	4 (1.92)

Regarding the *time* aspect of digital printing, both customer categories were satisfied. Time was actually the only CSF that fulfilled the demands of the customers in general, as there was only one respondent that was not satisfied or more than satisfied with the time factor of digital printing.

Quality was the CSF that the customers had the highest demands on and were least satisfied with. All respondents but two did not think that the quality of digital printing did meet their demands. There has been a lot of talk about “good enough” in quality of digital print. This study, however, shows that quality is the factor that the customers gave the highest priority and where least satisfied with. Many respondents also pointed out the need for quality improvements to bring quality closer to what the customers expect, that is the quality of offset, if they were going to produce more with digital printing.

In regards to the *functionality and possibilities* of digital printing, the customer group was divided. The advertising agencies did not feel that this factor met their demand. The direct customers were more than satisfied with the functionality.

The vertical integration in the printing houses has led to direct customer contact, which made it possible to make use of the technology and “educate” the customers to take advantage of the technology. Earlier research shows that the digital printing houses are not fully satisfied when working with advertising agencies, since they believe that they do not take advantage of the functionality and possibilities that digital printing technology offers (Mejtoft, 2006). The fact that direct customers are more satisfied with functionality may come from two sources; direct customers level of knowledge regarding this area is lower than for advertising agencies and digital printing houses may influence direct customers more easily to take advantage of the technology and functionality.

In general the respondents were not satisfied with the *price* (Figure 3), although this was a CSF that was ranked low in respect to the other factors (Table 1). The dissatisfaction with the price of digital print may just be a consequence of the fact that customers, by definition, think that prices are too high. The satisfaction problem with the price may also be a result of the fact that the price of digital printing is in general higher per copy than for e.g. offset. Only Customer 2 was more than satisfied with the price. This was because they choose to make use of more of the functionality with digital printing when customizing their instruction manuals and therefore they rank price very low in respect to the other factors. In

other words, they seem to have found the added value that digital printing offers. As mentioned before, most of the customers used digital printing for applications like print-on-demand, which has a low customer value. For customers working with applications that provide a higher perceived customer value, like variable data printing or web-to-print, the price becomes more insignificant.

Price was the CSF that got the lowest total ranking. The printing industry in general is in a state of hypercompetition and the price competition is fierce. This is probably the reason why the price is of low importance when buying printed material, since most printing houses on the market have generally speaking low prices.

By calculating a “score point”, it is possible to determine how the different customers rank the individual CSF against each other. The basis of calculation is that each company contributes equally to the total score, independently of how they have ranked the CSF. If two or more CSFs have the same rank they share the sum of their points. This makes it possible not only to determine the total rank of the CSF but also how they are distributed along the “score axis”, that is the value in the parenthesis in Table 1. It is possible, in the future, to conduct further studies to investigate how the importance of the CSFs change over time.

Future changes

Many of the customers strive towards a non-printed solution for the material that is printed today. This may include both building more intelligence into industry products and handling more campaigns through other cheaper and faster mediums as the Internet. Substituting printed material for electronic material may not have the same negative effect on digital printing as it has on offset. Digital printing will be the natural channel for printed output of material that is otherwise spread electronically, as such material most often is printed on-demand or an output channel for material customized on the Internet by web-to-print solutions.

Conclusions

The study concludes that digital printing does not entirely fulfill the demands that the customers have on their printed material. But all respondents indicate that digital printing is becoming an increasingly important production technology for their printed material.

Applications like print-on-demand, that provides a low added value, was one of the main reasons that customers engaged in digital printing in the first place. This basic application is still how most customers make use of digital printing

even though some customers believe that they benefit from simple variable data printing.

Among the critical success factors (CSF), Time, Quality, Functionality, and Price, quality is the factor that customers believe is the most important one. This is also the factor that they are least satisfied with in relation to their demands. For small volumes, digital printing is a quick printing technology in relation to traditional printing technology, like offset. This study shows that time is the only factor that customers were more than satisfied with. In general customers were quite price insensitive, which is a result of the fierce price competition in the printing industry. Customers that utilized more complex applications like variable data printing and web-to-print were more satisfied with the price than those using basic applications like print-on-demand.

Many of the customers indicated that their future goal is to go towards a non-printed solution, like intelligent products or Internet based information to avoid large printed volumes. In many aspects the use of digital publications and distribution is a very cost-effective way of working, and by implementing such a system digital printing will be the channel for printed output.

Acknowledgement

I would like to dedicate a special thanks to *all the respondents* at the studied companies for their anonymous participation in this research study. I would also like to thank my supervisors *Prof. Nils Enlund*, KTH, and *Dr. Marianne Klamann*, STFI-Packforsk for their valuable comments. The *EU Structural Found*, the *industry participants* in the Digital Printing Community project and the *Kempe Foundations* are gratefully acknowledged for their financial support.

References

- Anderson, J. C., & Narus, J. A. (2004). *Business Market Management, Second Edition*. Pearson Education International.
- Bell, J. (1999). *Doing your research project, Third edition*. Open University Press.
- Birkenshaw, J. (2004, April). *The future of print on paper*. Prepress and print Technology, Pira International. Retrieved January 26, 2005, from <http://pira.atalink.co.uk/pulp-and-paper/163.html>
- Blocher, E. J., Chen, K. H., & Lin, T. W. (1999). *Cost Management: A Strategic Emphasis*. Irwin/McGraw-Hill.

- Broudy, D., & Romano, F. (1999). *An Investigation: Direct mail responses, Based of color, personalization, database, and other factors*. Digital Printing Council, White Paper. Retrieved August 1, 2005, from http://www.gain.net/PIA_GATF/PDF/romano1.pdf
- Carr, N. G. (2003, May). *IT Doesn't Matter*. Harvard Business Review, pp. 41-49.
- Cooper, R. (1995). *When Lean Enterprises Collide, Competing through Confrontation*. Harvard Business School Press.
- D'Aveni, R. A. (1994). *Hypercompetition Managing the Dynamics of Strategic Maneuvering*. FreePress.
- D'Aveni, R. A. (1995a). *Coping with hypercompetition: Utilizing the new 7S's framework*. Academy of Management Executive, Vol. 9, No. 3, pp. 45-57.
- D'Aveni, R. A. (1995b). *Hypercompetitive Rivalries – Competing in Highly Dynamic Environments*. FreePress.
- D'Aveni, R. A., & Ravenscraft, D. J. (1994). *Economies of integration versus bureaucracy costs: Does vertical integration improve performance?*. Academy of Management Journal, Vol. 37, No. 5, pp. 1167-1197.
- Day, G. S., & Wensley, R. (1988, April). *Assessing Advantage: A Framework for Diagnosing Competitive Superiority*. Journal of Marketing, Vol. 52, pp. 1-20.
- Dobler, D. W., & Burt, D. N. (1996). *Purchasing and supply management, Sixth Edition*. McGraw-Hill.
- Evans, P. B., & Wurster, T. S. (2000). *Blown to bits – How the new economics of information transforms strategy*. Harvard Business School Press.
- Ford, H. J., & Crowther, S. (1922). *My Life and Work*. Doubleday, Page & Company.
- Friedman, L. G., & Furey, T. (1999). *The Channel Advantage*. Butterworth-Heinemann.
- Gadiesh, O., & Gilbert, J. L. (1998, May-June). *How to map your industry's profit pool*. Harvard Business Review, pp. 149-162.
- Gennard, J., Ramsay, H., Baldry, C., & Newsome, K. (2000, September). *Strengthening social dialogue and cross-border trade union networks in the graphical industry, Final Report*. Centre for European Employment Research (CEER), University of Strathclyde.
- Gilboa, R. (2002). *The Production Digital Printing Market: Opportunities and Trends*. IS&T's NIP18, pp. 134-138.
- Glaser, B. G., & Strauss, A. L. (1967). *The Discovery of Grounded Theory, Strategies for Qualitative Research*. Aldine de Gruyter.

- Goulding, C. (2002). *Grounded Theory, A Practical Guide for Management, Business and Market Researchers*. SAGE Publications.
- Gustavsson, B. (1998). *Metod: Grundad Teori för ekonomer*. Academia Adacta.
- Harrigan, K. R. (1984). *Formulating vertical integration strategies*. *Academy of Management Review*, Vol. 9, No. 4, pp. 638-652.
- Harrigan, K. R. (1985). *Vertical Integration and Corporate Strategy*. *Academy of Management Journal*, Vol. 9, No. 2, pp. 397-425.
- Kipphan, H. (2001). *Handbook of Print Media, Technologies and Production Methods*. Springer.
- Kotler, P., Wong, V., Saunders, J., & Armstrong G. (2005). *Principles of Marketing, Fourth European Edition*. Pearson Education Limited.
- Kuchinskas, S. (2000). *One-to-(N)one?*. *Business 2.0*, Vol. 5, Issue 17, pp. 141-145.
- Mejtoft, T. (2006). *Strategies for Successful Digital Printing*. *Journal of Media Business Studies*, Vol. 3, No. 1, pp. 53-74.
- Peppers, D., & Rogers, M. (1993). *The one to One Future*. Currency Doubleday.
- Peppers, D., & Rogers, M. (2000). *The one to One Manager*. Currency Doubleday.
- Peyrefitte, J., Golden, P. A., & Brice, J. (2002). *Vertical integration and economic performance: a managerial capability framework*. *Management Decision*, Vol. 40, No. 3, pp. 217-226.
- Porter, M. E. (1980). *Competitive Strategy: Techniques for Analyzing Industries and Competitors*. Free Press.
- Porter, M. E. (1985). *Competitive Advantage: Creating and Sustaining Superior Performance*. Free Press.
- Porter, M. E. (2001, March). *Strategy and the Internet*. *Harvard Business Review*, pp. 63-78.
- Porter, M. E. (1996, November-December). *What is Strategy?*. *Harvard Business Review*, pp. 61-79.
- Robson, C. (2002). *Real World Research, Second edition*. Blackwell Publishing.
- Roos, J., & von Krogh, G. (1996). *Managing Strategy Processes in Emergent Industries, The Case of Media Firms*. Macmillan Press.
- Saunders, M. N. K., Lewis, P., & Thornhill, A. (2000). *Research Methods for Business Students*. Prentice Hall.

Stewart, T. A. et al. (2003, June). *Does IT Matter? An HBR Debate, Letters to the Editor*. Harvard Business Review, pp. 41-49. Retrieved August 15, 2005, from http://harvardbusinessonline.hbsp.harvard.edu/b02/en/files/misc/Web_Letters.pdf

Svensson, G. (2003). *Consumer driven and bi-directional value chain diffusion models*. European Business Review, Vol. 15, No. 6, pp. 390-400.

Wiggins, R. R., & Ruefli, T. W. (2005). *Schumpeter's Ghost: Is hypercompetition making the best of times shorter?*. Strategic Management Journal, Vol. 26, pp. 887-911.

Appendix 1

Mean-centered results of the survey.

