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The European Publication Printing Industry

An Industry in Profound Changes

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Abstract

A comprehensive study of the European publication printing industry was carried out by the European Rotogravure Association (ERA) between 1984 and 1986. The study comprised two parts – one with confidential data only for those participating in the project group and a second part with non-confidential data which was published for the outside world. The findings were presented by me, at that time the Secretary General of ERA, at the ERA Annual Meeting 1986 in Elsinore, Denmark.

Subsequently, I presented the non-confidential findings to many other industrial meetings of the printing industry in Europe and the US. At the time there were only two printing methods available to the industry – gravure and web-offset - and the pros and cons of the two methods were hotly debated in the trade press.

During the last decade, web-offset printing has grown substantially, and the process has today a larger market share in the European publication markets than gravure printing. Now twenty years later, a new comprehensive study of the European publication printing industry will be carried out, with particular emphasis on the present European market situation. The present thesis is the first part of the total study.

Three scientific papers are included in this thesis, all of which have been presented and published during 2005. The first paper was presented at the TAGA (Technical Association of the Graphic Arts) conference in Toronto, Canada in April and concerned the far-reaching technological changes which have taken place in the industry during the last 20-25 years; going from a totally analogue prepress production workflow in the early 1980's through the 'Desktop Revolution' a decade later to the fully digital production process today. The path from the "good old analogue process" mainly controlled by craftsmen and to a greater or in some cases less degree by the printing unions to the present monopoly by Adobe Systems is described in this paper. These changes have made it possible to change the industry completely; going from the integrated publishing and printing companies to a situation where many publishers buy the necessary print

capacity on a European market. The previous country-specific markets with their language barriers protecting the domestic players have been superseded by publishers acting as print buyers with the most cost-efficient choice in mind. Print quality and service rendered are seen as commodities today and the previous high entry barriers when introducing a new publication have become lower. The number of titles has grown but the average circulation has decreased. Nevertheless, the growth in volume in the publication printing market has been substantial and paper consumption has risen from 6.7 million tons in 1984 to 12.4 million tons in 2004.

These changes would not have been possible without some very powerful leaders in the media, such as Robert Maxwell who changed the British publication printing industry between 1982 and 1984. Previously the industry was very inflexible, using old fashioned work practices and ancient technology, and the management and owners were hampered by extremely strong unions resisting all necessary changes. Mr Maxwell succeed in changing the situation and in two years he reduced the workforce from 6 000 down to 2 000, closed a number of inefficient printing plants, and launched a huge reinvestment programme in new technology. In the paper "Leadership in Media – about Robert Maxwell" which was presented in October at a Leadership Conference in Jonkoping, Sweden, I have discussed these changes in more detail.

Other leaders in most European markets have followed suit, and the latest change took place this year with the creation of Prinovis Ltd % Co KG. This company is owned by the three largest publishers in Germany, Springer Verlag AG, Gruner & Jahr and Arvato/Bertelsmann. Prinovis consists of all the previous gravure printing plants belonging to the owners including a newly erected gravure printing plant in Liverpool, UK, with the exception of the gravure printing plants belonging to Arvato/Bertelsmann in Spain and Italy. The new entity will control about 25% of the total gravure capacity in Europe, but in relation to the total market it will only be about 10-12%. This may be the reason why the control commission in the EU accepted the merger, despite the fact that Prinovis will control about 30-35% of the total publication market in Germany.

The last paper was presented at the IARIGAI (International Association of Research Organizations for the Information, Media and Graphic Arts Industries) conference in Porvoo, Finland in September and concerned the issue of processing of printing forms, i.e. gravure cylinders and web-offset plates. The title was "Benchmarking Gravure Cylinders vs. Web-offset Plates" and the findings in the investigation of the current processing costs were presented. During the largest exhibition in the market, Drupa 2004, it was obvious that everybody was talking about the latest technology in the offset market, and very few were interested in gravure. Using the facts and figures from the study presented in 1986, a hypothesis was formulated; that the previous cost relations between a gravure cylinder and a web-offset plate (calculated per m^2 or A4 page) have seriously deteriorated and that the cost and lead-time in the gravure cylinder process are a serious threat to the future of gravure printing.

A questionnaire was created and distributed to all ERA Active Members (gravure printers) and selected web-offset printers as well as to the leading suppliers in the field. The investigation revealed that both processes had reduced their processing costs substantially during the last twenty years, but indeed that some of the gravure printers had been able to reduce their costs in a remarkable way. Despite a large scatter among the gravure printers, the average cost relation between gravure and web-offset plate making has gone from 1:3 to 1:2 in twenty years. There are several reasons for this development; gravure cylinder processing was very early in going all digital, hence gaining a superior control of the engraving which in turn has led to the suspension of gravure wet proofing. Today any gravure printer can use an almost off-the-shelf inkjet printer with a suitable software package; and excellent preproofs emulating the final gravure print can be assured.

Preface and acknowledgements

Between 1981 and 1987 I was Secretary General of the European Rotogravure Association (ERA) in Munich. In the spring of 1985, the ERA Board of Directors asked me to organize a task force containing some of the most influential executives among the ERA members, and the objective of the task-force was to investigate and evaluate the competitiveness of Gravure vs. Web-offset printing and suggest possible improvements. The task force published two comprehensive reports in 1985 and 1986, of which the latter became available also to non-members. However, the presentations were made in such a way that no individual participant could be identified, and one prerequisite was that all data collected should be kept confidential within the ERA Secretariat and access was exclusively given to me.

Among these were sensitive data and information about individual cost calculations and estimations of specific printing jobs, comments about the supply of raw materials (ink and paper), relations to customers etc. from the participating members. When I decided to leave my position as Secretary General and return to Sweden in 1987, I was asked to care of all the confidential information and data, databases and software programs specifically made for this purpose.

For almost 20 years, all the information has been stored in my home office, and I always had the opinion that this material was too valuable to be just forgotten. Hence, the idea of a scientific study covering the European publication printing industry has been in my mind for some time. Nevertheless, not until 2003, I started to investigate the interest from in the industry about my intentions. I then contacted some industrial executives about their opinion of a scientific approach to the material and to compare the present situation in Europe with the findings from 1985/86. The interest I met was very encouraging, and soon after Professor Nils Enlund of Media Technology and Graphic Art at the Royal Institute of Technology (KTH) in Stockholm was contacted.

Professor Enlund very quickly realised the potential of the information I had in my position and verified that indeed I had the basic qualifications to graduate as Doctor of Technology in due course. He invited me to write an application with a detailed project description including a time schedule. A few months later in August 2003, the application was accepted by the administration, and the following week I decided to visit the

present Secretary General of ERA in Munich to inform him about my intentions and ask for his support. Following his approval, I was then asked to present my study to the ERA Management Meeting (Annual Business Meeting) in Nuremberg on the 22nd of October 2003. Hence, the official start of my study can be traced to October/November 2003.

In presenting this thesis for the licentiate degree at the Royal Institute of Technology, I am half way along the road to a doctorate degree. I intend to present my doctorate thesis not later than in the spring of 2007. Nevertheless, future detailed planning depends on several factors such as suitable funding (sponsoring and other financial support), continuation of the support by the ERA and its present members as well as available future events for the publication of scientific articles in the media industry.

I would like to thank Nils Enlund for his interest and support in my study. Without him there would have been nothing of my late academic career, and I am most grateful for his enthusiasm and valuable comments. I would like to thank the ERA Secretariat for their support and interest, and allowing me to participate in the ERA technical commissions and other meetings. I would also like to thank Rune Sirvell, former President of ERA, my mentor and very good friend, for his keen interest and most valuable support. With his knowledge and great industrial experience in the publication printing industry, he has been both very helpful and supportive. Another friend, still very active in the European publication industry, is another former President of ERA, Mr Giorgio Gianoli from Italy, and his suggestions have been most welcome. Finally, Dr Anthony Bristow has also been very supportive, and he has given me valuable advice.

My wife, Suzanne, cannot be forgotten, because her strong and never ending support during almost 30 years of marriage has always kept my confidence and spirit on a high level. In particular during the last two years, she has been asked many times to read and comment on my deliberations; not always an easy task, but she always complied with my wishes in her own gracious way.

List of included papers

This study consists of three previously published research papers:

Paper I

Bjurstedt, A: "*Converging technologies in the prepress from 1980 to 2003"*, TAGA 2005 Research Conference, Toronto, Canada, to be published in the TAGA 2005 Proceedings

Paper II

Bjurstedt, A: *"Power in the media – Robert Maxwell - A study of power in leadership*", Challenges at the Top: Leadership in Media Organizations, Media Management and Transformation Centre, Jönköping International Business School, Sweden , October 2005

Paper III

Bjurstedt, A, *"Benchmarking Gravure Cylinders vs. Web-offset Plates"*. Proceedings of the 2005 IARIGAI Research Conference, Porvoo, Finland, 2005, pp 59-81.

Contents

1. Introduction

This thesis is the first part of an ongoing investigation of the European publication printing industry and it highlights some of the technological developments which have impacted the structure of the publication printing market and its developments until the present time. The publication printing industry is manufacturing products such as magazines and catalogues which are published periodically, from generally once a week to once a year. In 1985-86, one of the most comprehensive studies of the publication printing industry was carried out by the European Rotogravure Association in Munich. This study was the first of its kind and no comparable study has, to the author's knowledge, ever been compiled. It discussed in a neutral and objective way the pros and cons of both the gravure and web-offset technologies, and how and when one or the other method should be used. In 1985, the production methods for both processes in the prepress area were mainly manual with the extensive use of graphic films. However, some of the very advanced gravure printers were already using digital technology outputting screened separations from colour page make-up systems to produce ready-to-engrave pages.

The gravure industry can be structured into three different segments, which all have different markets and product requirements although the common denominator is the gravure printing technology:

- Packaging gravure – printing on paper, cardboard and flexible materials such as plastic foils, aluminium etc. for packaging purposes
- Decor gravure – printing on paper or other materials for subsequent lamination for flooring (excellent simulation of woodgrain), panels etc.
- Publication printing

The extremely fast progress of digital technology in the 1990's had a great impact on the publication printing industry, particularly in the prepress area. New and affordable software packages for editorial and image manipulation were quickly accepted by the printing industry, and within a short time the previous analogue technology was abandoned. During the

recent interviews, it became evident that most prepress work is now being done outside the printing companies (outsourced). Even the prepress work of the integrated publisher/printer has moved from the printing to the publishing division. These new techniques have made a dramatic change in the way the industry had previously worked, and the customer has gained complete control of the work flow, mostly based on PDF-technology (Pfiffner 2002), and of much of the prepress work which was previously created and controlled by the printing industry.

Whilst many publication gravure printing companies have been struggling with this change during the last 10 years, most web-offset printers have been totally unaffected and have benefited from the new digital workflow systems available on the market. The reason is quite simple. Most web-offset printers never bothered to invest in prepress technology, and they decided very early to outsource all prepress work (except plate-making) to third parties. The common opinion in the industry is that plate-making for offset has made dramatic progress during the last few years, and many technical solutions have been developed for the Computer-to-Plate technology. The perception of the gravure cylinder processing, on the other hand, is that little has changed during the last decade.

2. The area of research

The area of research is the European publication printing markets, and how these have changed over a period of twenty years. The research target is the European publication printers, and to some extent those publishers who are still maintaining their printing facilities. In the large expansion of common interest magazines and catalogues during the first 10-15 years after the Second World War, most publishers regarded having their own production process as a strategic asset. This was probably true when there was a shortage of print production capacity, and the supply of new machinery was limited and investments were scarce.

The situation changed when the continuing growth of printed advertising became limited as a result of the arrival of commercial television in the 1960-1970's in Europe with Italy and France as the fore-runners – and in Scandinavia 10-15 years later. Advertising expenditures then went not only to printed products but to other media as well. One of the hypotheses of this study is that, as a result of the structural changes in the market during the last 10-15 years, it has become the print buyers' market, whether one is a publisher or a catalogue producer.

The research questions to be answered in this thesis, and which define the aims of this thesis, are the following:

- Has the publication market become a buyer's market? If so, why and how?
- What are the driving forces for changes in prepress technology?
- What has been the role of leadership in the structural changes?
- Are there any differences between different geographical markets?
- What techno-economical factors have contributed the structural changes?

Delimitations

This is an investigation of the European publication printing industry, with an emphasis on, but not limited to, the members of the ERA. The research and reference material presented in this thesis are subject to some limitations in relation to the resources available. However, during the work on this thesis, and indeed during the preparation of the articles

which are a part of it, it has been apparent, that there is unfortunately very little if any scientific literature available related to the publication printing industry. Hence, the references are, to some extent, from related industries chosen as being as close as possible to publication printing.

3. Methodology and Theoretical Framework

3.1. Introduction

In order to investigate or research any field in a scientific manner, the researcher has to use a methodology which ensures that he is really studying what he is supposed to study. This chapter concerns how a scientific research process in the media field is influenced and controlled by the particular methodology used. The first part is an overview of contemporary literature in the field (see also the list of references). The second part comprises a description of the two leading analytical traditions, quantitative and qualitative analyses.

The first two papers included in this thesis are investigative and can be regarded as qualitative research papers. The third paper on *"Benchmarking Gravure Cylinders vs. Web-offset Plates"* concerns the techno-economical changes which have taken place in the publication printing industry during the last 20 years, and in particular how the previous working conditions in processing printing forms have changed as a result of the introduction of digital technology in this area.

The scientific approach in this study is not limited solely to the expression of a certain methodology but has its roots in my knowledge and experience from the publication printing industry in applying the methodology. Hence, most of the knowledge and/or experience here presented are derived from an on-the-job position in the printing industry, and from years of working close to those industry leaders concerned. I have had the privilege of working in the European publication printing industry for quite some time, and I have enjoyed a close working relationship with the leading executives through my tenure at the ERA.

3.2 Overview of contemporary literature

There are two methodological approaches described in the literature; the positivistic and the hermeneutic. The positivistic approach comes from the progress of the empirical natural sciences in the 19th century, and the desire to create a common scientific methodology for all sciences (Patel & Davidson 1991). This approach has been abandoned as a philosophy, but it is still considered to be a way of conducting scientific research and of understanding practical research work. The hermeneutic approach on

the other hand was a method for interpreting biblical texts in the 17th century, and later in the 19th century it became a more general methodology for interpreting human or social sciences. During the 20th century, the theory has been developed to a more existential philosophy for understanding human life and basic sociology science.

The methodology of the positivistic approach is regarded as hypothesis-deductive with an empirical testing. In contrast, the hermeneutic methodology is to try to understand and interpret the purpose of the research subject, as well as the condition of the researcher. Merriam-Webster OnLine (August 2005) defines methodology as:

- a body of methods, rules, and postulates employed by a discipline; a particular procedure or set of procedures
- the analysis of the principles or procedures of inquiry in a particular field

The literature concerning methodologies in media research is very comprehensive, but it is concentrated mainly on research into the social impact of media and/or how the impact of various media relates to the public or part of the public (stratified). Further, the emphasis is mainly on the broadcasting media such as radio and TV and also film/Video, and recently to a lesser extent on printed media. Hence, it is very difficult to find anything about the distribution and/or about the production processes of printed media.

There is very little in the literature about a more general methodology in the media field where the producers rather than the consumers are investigated. Nevertheless, it is believed that some of the general rules described in the literature can be applied in this thesis. Patel and Davidsson (1991, p.31) give a common definition of the hermeneutic approach and its relation to the subsequent logical steps in the research process:

- Know-how and knowledge
- Decide what to investigate – what is the problem more precisely
- Decide how the investigation should be carried out
    - Research targets – target groups
    - Conducting the research
    - How to collect information

- Research work
- Analyzing/assessing the data
- Report/accounting

The necessary know-how and/or knowledge in a particular field or area of science can be achieved by studying the literature covering the subject matter. In my case, I have of course had the advantage – as previously indicated – of not being a newcomer to the field but of having thirty years' background experience, much of it at a high executive level.

The two major research approaches in the media field, quantitative or qualitative analysis, are both covered by Östbye et al (2003, p.99 and p.156) and Bruhn Jensen (2002, p.207). The latter is more comprehensive and covers the differences and also the interaction between these two approaches in great detail.

3. 3 Important areas of research and methods

Media and communications studies have developed a variety of analytical procedures and designs, and empirical studies have relied on six different prototypical methods, as shown in Figure 1. In addition to the qualitative – quantitative distinction, these methods are characterized by their forms of data collection and the resulting types of evidence.

Each basic method, whether employed singly or in combination with other methods, raises a number of methodological, epistemological, as well as political questions. In media research, Bruhn Jensen makes a distinction between the methods to be used.

	Qualitative	**Quantitative**
Speech/verbal language	Interviewing	Survey
Action/behaviour	Observation	Experiment
Texts/Documents	Discourse analysis	Content analysis

Figure 1 – prototypical research methods by Bruhn Jensen (2002, p.207).

Scientific approaches and social implications are studied in the quantative research process (cited in Bruhn Jensen 2002, p.206). Quantitative studies

are covered both in terms of their basic categories and operations and with reference to the different relevance of survey, experiment, and content analysis. Qualitative studies are presented, similarly, in terms of the systematic processes of interviewing, observation, and textual research, including issues of data collection and data analysis. The complementarity of qualitative and quantitative research is to examine references to both concrete examples and to classical problems in the philosophy of science.

3.3.1 Quantitative approach

Quantative research is primarily concerned with demonstrating cause-effect relationships and any research project begins by setting up a hypothesis. A hypothesis is a proposition to be tested, or a tentative statement of a relationship between two variables. Whilst hypothesis testing is not unique to quantitative research, it is one the fundamental elements, and almost a required aspect of quantitative academic research. In this case, the hypothesis is that the previous relationship of the processing costs of producing gravure cylinders and web-offset plates has changed dramatically – in particular concerning lead-times for both editorial content and advertising materials. In short the hypothesis is now that gravure cylinders are perceived to be much more expensive and slow to process than web-offset plates. The relatively new technical advancements in computer-to-plate technology have further aggravated the situation.

The first step in the quantative research is to create a survey and the main purpose of the survey is to find a sufficiently descriptive survey. In this particular case, a questionnaire was created already in 1985 and the main question has been whether the old questionnaire can be used; and we do not need to reinvent the wheel says Bruhn Jensen (2002, p. 57) *"We are part of a continuing conversation about the structure and meaning of modern time and the ways they are changing. ..... To refuse their invitation to debate is to condemn ourselves to regularly reinventing the wheel*".

In Östbye et al (2003, p.152) there is a recommendation to make a pilot study to find out whether the questionnaire is designed correctly and does the right work in the survey such as:

- To test if the questionnaire is complete in its context
- To train the interviewers
- To test the length of the interview
- And finally to delete questions which do not work

This is now the rule rather than the exception according to Strauss & Corbin (cited in Bruhn Jensen 2002, p.77), who suggest that the purpose behind the questioning is to open up the data; to think of potential categories, their properties and dimensions. They help you to ask questions more precisely in the next interviews, or of any pertinent readings in the literature.

The basic concepts in quantitative research are:

- The variable
- The concept
- Independent and dependent variables
- Construct (as a combination of concepts)

The major variable at the time when the work reported in the third paper was carried out was the competitiveness of the gravure relative to the web-offset process and, in particular, the printing form preparation process, although there are of course many technical variables which are involved in the production and/or financial aspects involved in determining whether one printing process is considered to be more advantageous than another.

The construct or combination of concepts is to find out when or how the market accepted the absence of wet proofing of gravure cylinders. Figure 2 shows the possible structure of a survey suggested by Gunter designed as a questionnaire.

Mail questionnaires	
Advantages	**Disadvantages**
Cheap to run	Questionnaires not always returned
Can reach wide areas	May suffer delays in responses
Respondents can complete questionnaire at own pace	No control how respondents fill in
Offer anonymity	No one available to clarify
Avoid interviewer bias	
Telephone interviews	
Advantages	**Disadvantages**
Relatively cheap to run	Interviews must be short
Generate higher response rates than mail	Can only reach respondents with telephone
Researcher can control order of questions are answered	Open-ended questions are difficult to use
Can provide rapid data collection and processing	No visual prompts possible
Face to face interviews	
Advantages	**Disadvantages**
Have the best response rate	Very expensive to run
Permits longer interviews	Interviewers may have problems reaching certain locations (remote areas)
Visual prompts can be used	Interviewer bias can be a problem
Interviewers control the way questions are answered	
Interviewers can probe for more detailed responses	

Figure 2 – possible survey methods (cited in Bruhn Jensen 2002, p.216)

There are two fundamental issues in every academic research project, the reliability and the validity of the results, according to Siegel and Hodge from 1968 (cited in Bruhn Jensen 2002). Reliability concerns the dependability and consistency of the relationship between two variables or in the score obtained and a single variable at more than one point in time. Reliability can be established by carrying out repeated tests of phenomena and the relationships between phenomena, by repeating such tests among different groups with the same results. Validity and concurrent validity mean that a measure is associated with another indicator that has already been shown to be valid.

3.3.2 Qualitative analysis

There are three distinctive features shared in most scientific work, according to Bruhn Jensen (2002, p.236). He suggested that these are:

- The concept of meaning – the connection between meaning and action
- The naturalistic context – the assumption in the classical variety of anthropological fieldwork in which a researcher's lengthy immersion in a whole culture enables him or her to ultimately grasp in full 'the native's perspective' on reality. In a more modest form, qualitative studies involve the weighing of theoretical aims against practical constraints. At issue are not just restrictions with regard to time and money, but also epistemological questions (can a culture or context ever be known in full?) and ethical considerations.
- The interpretative subject - in one sense all research depends on the human subject as a primary instrument. That which distinguishes qualitative and quantitative projects in this regard is a global and continuous form of interpretation. In quantitative studies, interpretative agency tends to be exercised in a sequential and delegated form. The qualitative ambition, in comparison, has been for a single researcher to interpret 'meaning in action'.

The design of qualitative studies involves some important aspects. Also, they vary in the source or ground from which they are experienced, as suggested by Schatzmann & Strauss in 1973 (cited in Bruhn Jensen) such as:

- Strategy – a general plan for meeting and a particular setting which may generate relevant evidence building a relation between the researcher and informants in a designated time and space
- Tactics – to anticipate and prestructure the interaction which will yield evidence. The definition of people to interview – well-placed sources in a media company
- Techniques - researcher's concrete means of interacting with and documenting the field. Verbal language is a main constituent of all the methodologies reviewed below.

Qualitative data are exceedingly complex and they are not readily convertible into standard measurable units of objects seen and heard; they vary in levels of abstraction, in frequency of occurrence, in relevance to central questions of research.

An analytical survey not only collects descriptive data but also attempts to go on to examine relationships between variables in order to test research hypotheses. Interviewing - respondent interviews – all interview statements are actions, arising from an interaction between interviewer and interviewee (Bruhn Jensen 2002, p.240). Interview statements are, in a strong sense of the word, data, and they become sources of information only through analysis and interpretation.

With these recommendations in mind, the interviewer has to structure the discourse as in the following example:

1. Introduction about the purpose of the interview (survey) – secrecy, non-disclosure agreements etc.
2. Some minor less controversial questions about the market conditions in general
3. More complicated questions which needs some background and knowledge about the industry
4. A few more controversial questions related to the position of the company and problems perceived by the company/individual
5. Conclusion; asking some less controversial questions – some background questions

There are thus three different qualitative interview forms which address the issues of duration, structure and depth:

- Duration is determined largely by the overall purpose of a study to practical circumstances.
- Structure – the main challenge in planning and administering interviews is how to prestructure the interaction. It may follow a sequenced and subdivided interview guide or the exchange may cover a predefined set of themes from several perspectives.
- Depth – the researchers' responsibility when assessing the relevant depth of a qualitative interview. Depth is generally considered to be the strength of qualitative research, and thus also poses serious issues for the ethics and politics of research.

3.3.3 From conflict to complimentary

It is commonly recognized that quantitative research instruments are particularly suited to establishing the recurrence of events or objects (the expression of a particular opinion or a specific content feature). Qualitative approaches explore the singular occurrence of meaningful phenomena but with reference to their full context. Human experience calls for an exegesis, a reiterated and continuous interpretation of meaningful elements whose context may be redefined as the interpretation proceeds (Bruhn Jensen 2002, p.255).

Methodology distinguishes qualitative and quantitative research – not theory such as traditions and paradigms (Bruhn Jensen 2002, p.258). "*Kuhn's paradigm shifts in the context of conflict of methods concern the qualitative and quantitative analytical methods used in practice. "*

Bruhn Jensen has published ten rules for empirical student projects (Bruhn Jensen 2002, p.291):

1. Make sure to ascertain the rules and procedures in your social and cultural context and academic institution regarding the review of research involving human subjects
2. Always treat people under study as people. They are neither things nor texts. Informed consent.
3. Exercise caution and concretion. Prepare to give up a question if in context it violates the personal limits of the people involved. Be prepared to explain concretely the relevance of any question.
4. Practice reflexivity. The analysis of data begins the empirical field in both qualitative and quantitative projects; supplementary evi-

dence and notes will support both the respectful use of the respondents' contributions and the explanatory value of later interpretations.
5. Safeguard the anonymity of people and the confidentiality of information throughout the research process
6. Be honest about the sources of ideas informing a study and the contribution of peers in developing and conducting it
7. A research report includes accounts both of process and outcome, and of successes and failures in each respect
8. Two key requirements of a research report are a systematic documentation of evidence and an explication of the bases of theoretical inference
9. Explore several different publication formats, including a means of feedback to the people contributing to a study
10. Consider what is next – further research, the social relevance of findings; and the possible unanticipated consequences of the research

These rules are indeed relevant for the present project even if they were written with media consumers in mind and not executives in large companies. There are, however, several issues which are important in this context, particularly confidentiality of data and the feedback to those contributing. Some of the questions are very sensitive for the participating companies and can be regarded as being extremely close to the very competitiveness of the company.

3.4 Methodology used – some conclusions

The method of doing most of the third survey as a qualitative study is of course more time-consuming and expensive. On the other hand, some of the more critical issues may be easier to discuss face-to-face rather than through a more anonymous questionnaire distributed by mail. The notion of using more depth and time during the interview gives the interviewer more time to reflect and the possibility of adding supplementary questions. Hence, the interviewer is gaining not only a personal contact but also more in depth knowledge about the conditions on different markets in Europe, which may be useful in the next areas of research for a continuation of the study.

In the literature, some methods are given for assessing different sources, or for using different methods to assess the same source such as triangulation of methods or data – *"…the most important advantage presented by using multiple sources of evidence is the development of converging lines of inquiry, a process of triangulation….. "* (Yin cited in Östbye et al 2003, p.122). By using different sources, from both users and suppliers, in the recent survey some of the deduced results may be stronger than if they came only from a single source.

One of the most relevant issues in a survey is the assessment of how general the answers are. Are the answers also valid for those not taking part in the survey, since it is not possible to interview all companies and/or executives in the European markets? Is it possible to generalize the results of the survey and to state that these are the common perception of the market in Europe? The members of the ERA are the most influential companies in each European country – 2-4 companies in each country, depending on the size of the market. As these companies are predominant on their individual markets, it can be deduced that their answers are quite general and are valid for the purpose of this particular research study.

3.5 Comparison between the investigations made in 1985/86 and today

A comprehensive study of the European publication printing industry was carried out by the European Rotogravure Association (ERA) between 1984 and 1986. The study comprised two parts – one with confidential data only for those participating in the project group and a second part with non-confidential data which was published for the outside world. The findings were presented by me, at that time the Secretary General of ERA, at the ERA Annual Meeting 1986 in Elsinore, Denmark (Bjurstedt 1986).

In 1985/86, the investigation into the costs of processing printing forms was extremely confidential. In this context, about 20 of the leading companies (and/or their contact persons and managers) belonging to the European Rotogravure Association (ERA) were approached. Before the request for information was distributed, the content and structure was discussed and decided upon by a project group, which consisted of managers from the leading European publication printers at the time. Hence, all the questions/issues were debated and discussed during a number of

meetings taking place during the autumn of 1984; thus the relevance of the questions was certified. It can be assumed, in addition, that all respondents understood the background and the meaning of the questions; hence it can be assumed that both the reliability and the validity of the answers to the industry in general can be assured. The answering rate was about 75%.

Some of the basic data (non-confidential) and findings were also discussed within this group, and as a result two separate reports were published by the ERA in 1985 and 1986, and these are available today. The survey in 1985/86 can be regarded as a quantative analysis, which was supported to a less degree by direct interviews. The participating companies sent their estimations directly to the author personally, and the information was kept strictly confidential. It has been possible to retrieve the basic empirical data from my personal archives.

The 2005/2006 survey has been planned to have a broader audience, and the main emphasis is both a quantative and a qualitative approach extended with personal interviews. The interviewees have been selected among the most leading publication printer and suppliers in Europe, mot of them belonging to the ERA.

There are about 6-8 leading suppliers to the industry (plate and printing cylinder processing equipment manufacturers). Almost the same number of printers has been involved in submitting the information, although there have been some very important changes in the industry:

- Many companies in the first study have merged, changed ownership or gone out of business
- Many of the leading managers are no longer in the business; they left the industry, retired or are no longer available
- New structures in the industry have emerged in Europe

The reason for including the supplier industry this time is that most of the research in developing new technology and/or production processes is now concentrated to the suppliers. In the past, some relevant work in this area was done by the publication printers (=users). One major difference, although it is not significant, is that today all communication is carried out by e-mail using the Internet. One major challenge was that some of companies interviewed are not members (or have previously been mem-

bers) of ERA, which could have a significant impact on the quality of the answers. The main emphasis has been to interview these managers personally, and so far none no one has declined to participate.

4. Restructuring of the European publication printing industry 1985-2005

4.1 Introduction and definitions

In the mid-1970's, many European publishers began to consider the integrated publishing/printing works to be an obsolete business model, and the ownership of a printing plant could no longer be considered to be a part of the core business. After the Second World War, many printing plants had been destroyed and the surge for print capacity was large and the supply scarce. The press manufacturing industry, with its roots in Germany, needed considerable time to regain its former strength. Although they were challenged by British and US press manufacturers for about 20 years after the war, the German press manufacturers are now the leaders on the world market.

Another disturbing factor for the publishers was the rising power of the print trade unions in many countries, and their new strength was used to achieve a rapid increase in wages and other benefits, which increased the manufacturing costs of the published products. Some years later, the situation in the UK became very sensitive, and the major publishers of general interest magazines decided to outsource and sell their printing works.

Other countries followed suit, and in France, Finland and later Sweden, some of the major publishers sold their interest in the printing industry at the end of the 1980's. In the 1990's, publishers in the Netherlands (van Gorkum 2005) and Italy (Gianoli 2005) also sold their printing capacities to a third party, and Germany, Denmark, Italy (to some extent) and Switzerland were the only countries remaining in which the integration between publisher/printers was still very strong.

However, in these countries the major publishers started to divide their business and to create separate entities, so that the printing part could readily be shed. In the last few years in Germany and Switzerland, the publishers have created some very large independent printing companies; Prinovis and Swiss Printers respectively. Prinovis has three owners; Springer Verlag AG, Gruner+Jahr and Arvato/Bertelsmann. There are now very few remaining integrated publishers and printers in Europe - Burda and Bauer Verlag in Germany, Mondadori in Italy, and Egmont and Aller in Denmark - but it should be noted that all production facilities

are now separate juridical entities, which means that they are both easy to outsource and easy to sell.

With the technical developments of the last decade, all the work in the prepress has become digital and the task of completing the pages "ready-to-process" has moved to the originator (or in some cases another sub-contractor). Hence, the logical additional question concerns in what digital format this material is delivered (=supplied). In order to ensure a smooth internal process, all publication printers publish (either as a brochure or on the Internet) information about the colour profiles and other features that the supplied material must have.

The digital revolution has moved all the prepress work previously ordered (and contracted) by the publisher from the printer back to the publisher. Hence, the publisher today has both the creative and process responsibility for all the work, and with modern computer technology the task of creating pages in a magazine or catalogue is relatively easy. Travelling around Europe and visiting production facilities of the larger integrated publisher/printer, one sometimes finds large areas of empty floor space. These areas were previously occupied by the prepress operations, which are now superfluous.

4.2.1 Market size and volume growth 1985-2005

In 1985, the total consumption of publication printing paper was estimated by the European Rotogravure Association (ERA) with the assistance of the leading manufacturers of publication printing paper. The total volume was estimated to be 6.7 million tons of paper in 1985 (ERA Management Meeting 1985, Torino – Proceedings), and this volume had increased to almost 12.4 million tons by 2004 – see Figure 3 and Figure 4 for more detailed information (Meinander 2005).

The growth in paper consumption for printing has been considerable, not least during the last decade, despite all those who forecast around the turn of the millennium that the emerging Internet technology would lead to the end of printed matter and the paperless society. Nevertheless, the growth in paper consumption for publication printing (including improved Newsprint) has been quite substantial, as the annual growth has been about 3.4% (compound) between 1985 and 2004, i.e. for 19 consecutive years.

Figure 3

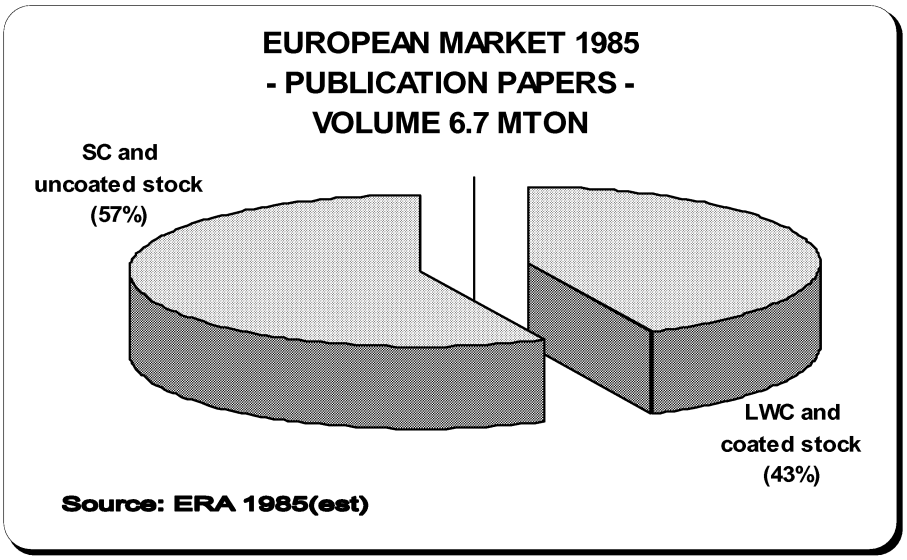
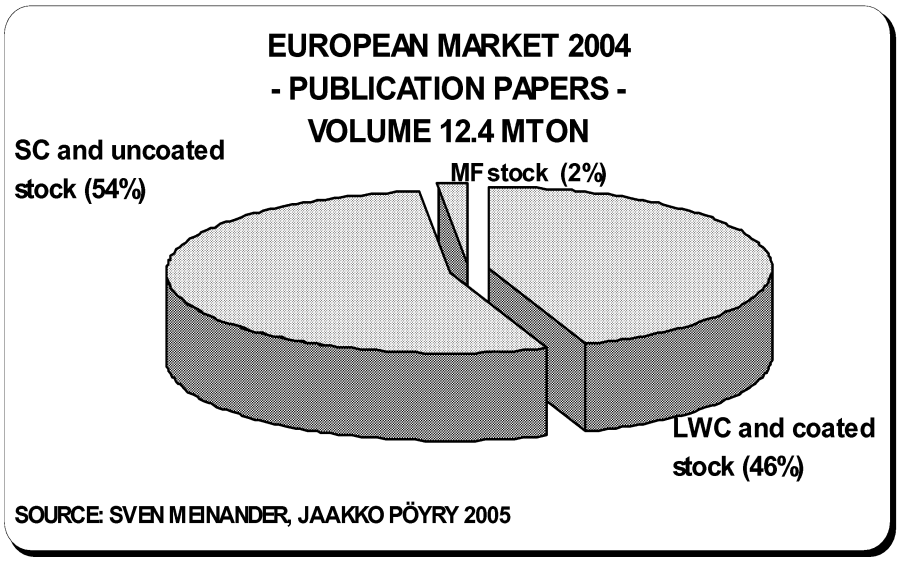


Figure 4



The data for 2004 have been validated by Jaakko Pöyry, the well-known Finnish consulting company in paper technology and research. It should, however, be noted that MF (machine finished) improved newsprint is expected to show a rapid growth in the next few years, because many

print buyers are expected to downgrade their paper in order to save money.

Figure 5

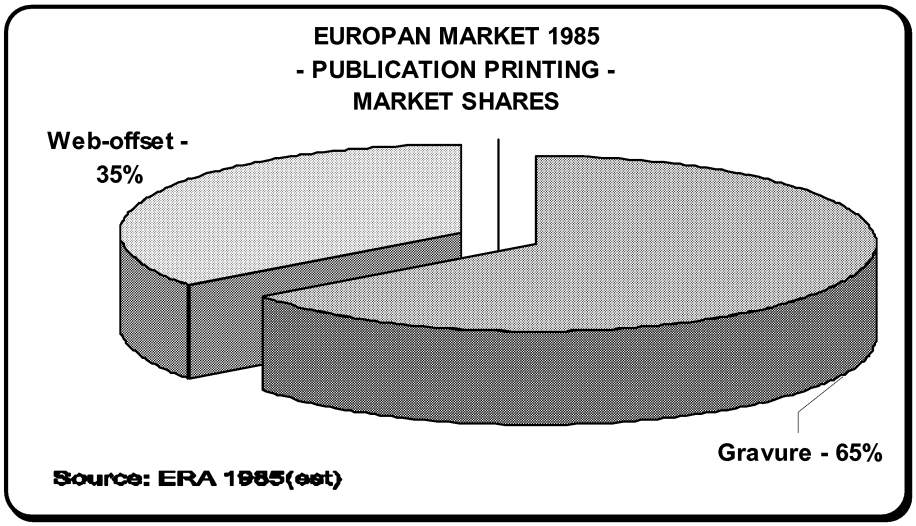
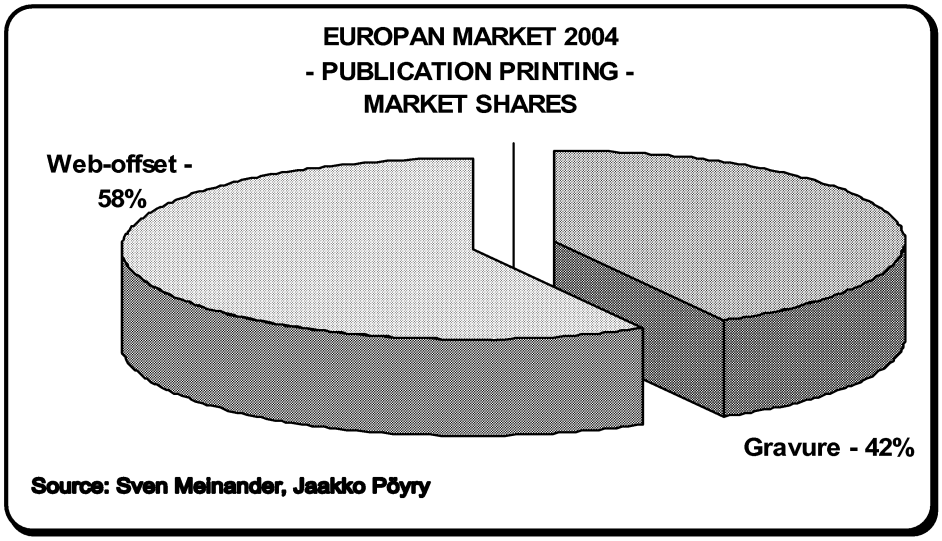


Figure 6



From the same sources, figures are also available that show the relative market shares for gravure and web-offset for the same years. Figure 5 shows the relationship in 1984 and Figure 6 shows the corresponding figures for 2004. Although the total volume is indisputable there are substantial differences among the market shares for the two major printing

technologies. During the recent 2005 ERA Annual Meeting in Amsterdam, Mr. Aumiller from MAN Roland (Aumiller 2005), showed some quite different figures, although the overall consumption figures were quite similar.

He suggested that the market share for commercial web-offset was about 65% in 2004. The difference is about 1 million tons of paper, which is hard to believe because that would imply that commercial web-offset would be a large consumer of uncoated paper. Experience from the field suggests, however, that uncoated paper is not often used in commercial web-offset and then only at the low end of the print quality range. Hence, the figure given by Jaakko Pöyry seems to be more feasible.

There is also another factor to be considered, namely the printed surface area. It has been suggested that the average paper grammage, particularly in gravure, has decreased, maybe by 5-10% since 1985. The reason is the rising costs of postage and transportation, hence the quest for lower grammage from publishers and print buyers. Someone may argue, therefore, that gravure printing should maybe have a market share 2-3% percentage points higher than that shown in Figure 6, but there is no reliable information available today to confirm whether this is correct or not.

It can be deduced from these charts that the annual growth of gravure has been very small – about 1%. Web-offset printing, on the other hand, has enjoyed a very good growth since 1985 by almost 4.5%. Hence, it can also be deduced that the growth of the publication gravure market has been not more than about 20% since 1985, which is in contrast to the situation for commercial web-offset printing which has grown by about 200% during the same period of time. The reasons behind this quite dramatic change will be the subject of future research (planned for my sixth paper for 2006/2007).

4.2.2 Changes due to technological developments

In this context it must be mentioned that the introduction of new technology in the editorial departments has lowered the technological and financial barrier in the creative work of both new and old titles. This development has had a profound impact on both the magazine publishing market and the printing market. The question is then the following – what

impact have these developments had on the demand of the market and, in addition, on the specifications of the printed products. It all started to happen about 15 years ago when the industry stopped using analogue photographic films and slowly became totally digital.

The real breakthrough came with the advent of desk-top publishing in the early 1990's; using PostScript and other affordable software packages like Adobe Photoshop, Aldus PageMaker and Quark Xpress (Pfiffner 2002). These programmes have made the prepress operations of handling pages in magazines, newspapers or general printed matters almost a commodity task, moving not only the control but also the execution of prepress operations from the printers to the publishers and print buyers. These events may not look very dramatic on the surface, but in reality they have caused the previous strong bonds between printer and print buyer/publisher to disappear. Another effect is the low entry barrier for producing many more pages and indeed new titles. The increase in the volume of new titles and pagination will be the subject of my future investigations during 2006, and the hypothesis is that the technological developments have indeed been the driving force behind the growth.

The demand for more colour in advertising competing with other media, particularly broadcasting media, has also been a contributing factor. But, without these new software programmes and a fully digital workflow making the editorial work much faster and cheaper, the growth of titles and pages would probably not have taken place. It is estimated that investing in an advanced working station for colour page manipulation and processing in 1984 would have cost about 50 times the present level, but more importantly; the present processing power is about 10-20 times higher than 1985. In addition, even if you need to train your personnel in working with these programmes, the training time has been reduced significantly because the new programmes are smarter and much more user-friendly and intuitive. Hence, the total cost of ownership for producing a colour magazine page has been reduced significantly even if the cost of trained personnel has risen with the rate of inflation.

The phenomenal growth in commercial web-offset must also be mentioned in this context. In a presentation by Aumiller (2005), it was suggested that between 2000 and 2005 the number of installations of new commercial web-offset presses has exceeded the number of new gravure presses. In fact it can be shown that the capital investment in new press

capacity during the same period of time has been substantial, € 2.5-2.6 billion, and that web-offset press manufacturers have enjoyed about an 80% market share. Further statistics from KBA (Puri 2003) suggest that total capital investments in offset technology for sheet-fed offset and newspaper presses is slightly larger than the investment in commercial web-offset presses. Hence, it can be deduced that capital investment in new gravure press capacity during this period of time has been less than 10% of the total investment in new press capacity.

4.3 Changes in the Scandinavian market

Finland

The situation in the Scandinavian markets has changed at different speeds and with different intensities depending on the country in question. The traditional role of the printer integrated with a publisher as an owner still prevails in Norway and Denmark, whereas in Finland and Sweden the larger publishers have given up their printing plants. In Finland, these changes started already in the late 1970's when two leading publication gravure printers merged and moved their new printing facility about 200 km outside the metropolitan area.

The new company was named Helprint which is today one of the leading publication gravure printers in northern Europe, but the ownership from two of the leading Finnish publishers vanished in 1997 when the company was sold to Union Bank of Switzerland. The company was later merged with a Swedish publication printing group, and a year later, the Union Bank of Switzerland sold the new group to Quebecor Printing Inc. of Canada, who formed the Quebecor Nordic Group operating both in Sweden and Finland (Kumela 2005).

In the beginning of the 1980's, there were two other minor publication gravure printers in Finland, both owned by independent publishers, but they were soon closed. At the end of the 1990's a new large publication printer was created which had both gravure and web-offset capacity in Finland. With this last take-over, most publication printers in Finland are independent from a publishing house and are operating on the commercial markets in Finland and abroad. There are, however, two large publication printing companies in Finland who are owned by large newspaper pub-

lishers. Although their web-offset capacity is utilized by in-house publications, they are also operating on the commercial markets.

Norway/Denmark

In Norway and Denmark, there are still bonds between the largest publishers and their internal printing plants, even though changes have taken place during the last 20 years. In Norway, two of the main competitors – Mortensen and Hjemmet – merged their printing plants and created a new jointly owned printing company. Hjemmet, which is owned by the second largest publisher in Denmark, Egmont Magasiner, consequently closed the only publication gravure printing plant in Norway. In Denmark, the two major publishers – Aller and Egmont Magasiner – are still operating their printing plants, even if the owners of Aller some years ago was considering to outsource the printing plant (Christell 2005). Egmont Magasiner also owned a gravure printing plant in southern Sweden, but it was closed and the production moved to Denmark in conjunction with the opening of the bridge across the straits between Sweden and Denmark in 1999.

Sweden

In Sweden, however, the changes have been more profound and dramatic. In 1985, there were seven publication gravure printers in Sweden and some of them were operating in both processes. Only one of these seven companies was an independent commercial printer and all the others were owned by a publisher. Most of the printers owned by a publisher were not active on the commercial print market, but the capacity utilization was about 70-80% and the remaining capacity was bought by the publisher on the open market when needed. At the end of the 1980's, however, the market changed quickly. Two of the smaller publication gravure printers were closed and the publishing and printing activities were bought by Aller in Sweden. The two major publication gravure printers in Sweden, Åhlen & Åkerlund (owned by the Bonnier Magazines) and Esselte Rotogravyr AB (owned by the Esselte Group, one of the largest printing conglomerates in Europe) merged in 1989 (Sirvell 2005). The new company was called Interprint AB an became one the largest publication printers in the Nordic countries. A new plant was built in one of the southern suburbs of Stockholm. In 1990, the third largest publication gravure printer (belonging to the federation of labour unions in Sweden) merged with Sörmlands Grafiska (one of the largest web-offset printers in Scandinavia owned by the Swedish parent company of SAS). A few

months later this newly formed company was merged with Interprint to form the largest publication printer in the Nordic countries (Sirvell 2005).

The newly established company was struck by the deep recession in 1992, and went into receivership and was declared bankrupt. Nevertheless, the receiver sold the restructured company to a local consortium of investors, among others the Bonnier Group, one of the original founders. However, after a short time, the company was sold to the Union Bank of Switzerland (UBS), who in the meantime had bought the largest publication gravure company in Finland, Helprint (Kumela 2005). The merger of these companies formed the largest group in publication printing in northern Europe.

A few years later, the whole group was sold to the Quebecor Inc. in Canada, one of the largest publication printers in the world, operating in North-America, the UK, and in central Europe and now also Scandinavia. Nevertheless, in 2004, Quebecor found it impossible to continue the gravure printing operations in Sweden. The plant was closed and the equipment was transferred to subsidiaries of Quebecor in Belgium and Finland. The reasons for the closure can be debated, but no information whatsoever has been released by Quebecor (Kumela 2005).

Hence, the only publication gravure printer still operating in Sweden is Aller Tryck in Helsingborg belonging to Aller of Sweden. However, the company is operating two very old gravure presses and the question is very obvious: when will Aller discontinue its gravure operations and expand its existing web-offset production?

Commercial web-offset has taken over the publication printing market in Scandinavia. Finland is an exception with two publication gravure printers in operation, but the number of Finnish web-offset printers is on a high level; the same number as all other countries in Scandinavia added together. But Finland is different, as two major Finnish newspaper groups both have invested heavily in commercial web-offset during the last decade.

4.4 Changes in Belgium, the Netherlands, Germany and Switzerland

Belgium
In 1985, seven gravure publication printers were operating on the Belgian market, but now there is only one left. The privately owned publication gravure printer Agora was declared bankrupt in 2004, and hence the only remaining printer belongs to Quebecor Inc. who bought the company from Hachette (Filipacchi) in 2002 (ERA Newsletter 2004). The commercial web-offset market is rather active with about two dozens printers, which is slight less than at the end of the 1980's.

The Netherlands
In 1985, there were six gravure printers including VNU (operating with three plants in NRM Haarlem, NDI Deventer and Rotogravure Etten), Vada, de Boer and Biegelaar & Janssen. The VNU (United Dutch Publishers) Group was for many years the largest magazine publisher for the Dutch consumer market with a keen interest in its printing operations. On the Dutch market, however, commercial web-offset printers have been active; including the very well-known Royal Smeets Offset also belonging to the VNU Group. In 1985, they bought the gravure plant of Vada in order to strengthen their publication gravure operations. In 1991, NRM Haarlem was closed by VNU, as part of their strategy to withdraw from publication printing. Two years later, in 1993, VNU sold its graphic division to Koninklijke De Boer Boekhoven Bosch, which formed the new company Roto Smeets De Boer listed on the Dutch stock market. The VNU Group, however, retained a minority position of about 11% in the new company. Following the take-over, the gravure capacity was concentrated to the two most modern plants, Deventer and Etten (van Gorkum 2005). A few years ago, VNU also disinvested all its consumer magazines to Sanoma in Finland, and it is no longer active in either the publishing or the publication printing market. Hence, in 2005, there are only two gravure printers left on the Dutch market, Roto Smeets and Biegelaar & Jansen (van Gorkum 2005). There are, however, more than a dozen commercial web-offset printers, which is about the same as 20 years ago.

Germany
In 1985, Germany was the largest gravure market in Europe with about 19 different gravure companies, some of them owned by the larger publishers, like Springer, Burda, Gruner + Jahr, Bauer Verlag and Sebald in Nur-

emberg. Now, after a number of mergers, acquisitions and closures, there are about eight. It is, however, suggested that the German gravure printers have about the same capacity now – 50% of the total in Europe – as they had 20 years ago. Hence, the growth in the German market has been of the same magnitude as that in the rest of Europe. In 2005, Prinovis was established on the market. This is the result of the merger of the printing plants of Axel Springer Verlag AG, Gruner + Jahr and Arvato/Bertelsmann, which created the largest publication gravure printer in Europe. The domestic market share is estimated to be about 30-35%, and the market share in Europe 10-12% (Prinovis 2005). The huge investments presently underway in Liverpool will significantly increase its European share. In order not to be subject to EU Commission sanctions, Arvato/Bertelsmann has opted to keep its publication gravure capacity in Italy and Spain separate under the name of Arvato (ERA Newsletter 2005). In addition there are four large groups in publication gravure, TSB Bagel, the Schlott Group, Burda and Bauer Verlag. The last are two well-known magazine publishers who have opted to keep their plants. It should be noted though, that both companies have recently made substantial investments in new printing capacity in Eastern Europe. A few years ago the Schlott Group (Schlott Annual Report 2004) was the first German publication printer to go public, while all other companies are still privately owned. There are a few small, independent gravure companies still in operation, and operating in some well specified niches.

The average German publication gravure printing facility is larger than most of its European competitors and one of the reasons is the combination of internal magazine production with printing catalogues for external customers. Mail-order catalogues are usually produced in those periods when consumer magazines have fewer pages and lower circulations, which make a very good production fit. Although gravure publication printing has by tradition had a very good position in Germany, the commercial web-offset printing is probably the largest market in Europe. Interestingly, a large privately owned web-offset printer, Appl GmbH, recently bought one of the niche publication gravure printers, Print Forum, specializing in printing covers and small pagination products. During the last decade complimentary investments in web-offset have been made by some publication gravure printers (TSB Bagel and Broschek belonging to the Schlott Group). Already in 1985 there were well over 100 companies in commercial web-offset, and the number has grown by 10-15% in 2004. Recent investments in new press capacity,

both in gravure and commercial web-offset, will make the market extremely competitive. Hence, one may assume that further consolidation in the market will occur in coming years.

Switzerland
In 1985, five publication gravure printers were in operation, but today there is only one, namely Ringier. The other publication gravure printers were closed one after the other, because the trading conditions with small circulations and the prevailing gravure technology made gravure publication printing uninteresting (TagesAnzeiger 2005). A few years ago, the Ringier management also decided to reduce its gravure capacity by closing down some older presses, and to sell the remaining gravure capacity on the European commercial markets. Its own magazines were to be produced in web-offset; hence two large web-offset presses were installed. Now the question is open; will Ringier continue on the commercial market and reinvest in modern gravure technology or will the gravure capacity be closed completely? It should be noted, however, that Ringier has been one of the most prominent publication gravure printers in Europe with roots in the process already in 1914 (Ringier 2005). Ringier was also one the founding fathers of the ERA in 1956. The commercial web-offset market has remained active with high quality ambitions. The number of commercial web-offset printers has not changed.

4.4 Changes in Italy, Spain and France

France
France once had one of the most advanced publication gravure industries in Europe, but because of the poor commercial environment during the 1970-1980's the industry slowly lost its previous competitive position in the market. Nevertheless, in the middle of 1980's there were nine publication gravure printers in France. Although the French publishers never were involved in the printing production, one of the largest was still owned by one of the leading publishers in France, Hachette (Filipacchi). The commercial web-offset market gained momentum in the beginning of the 1980's, and there were already then about 90 companies operating in the publication market, one of the major players being Jean Didier. A major expansion of publication gravure came in 1985, when he decided to enter the gravure market and built one of the most modern gravure plants in Europe. He later succeeded in consolidating a number of smaller gra-

vure companies into his group. However, in 1995 Quebecor from Canada entered the French market, when the whole Jean Didier group was acquired. In 2002, Quebecor Inc. also bought the publication gravure plants from Hachette Filipacchi in France and Belgium, and further consolidated the French publication market. According to the Annual Report 2005 from Quebecor (Quebecor 2005), its French subsidiary seems to underperform and substantial losses have occurred during the last few years. The competition in France, and indeed in Europe, is very hard, and those not using the most modern and efficient equipment will suffer (Gianoli 2005). Although the French commercial web-offset industry has grown very fast during the last decade, and is now possibly the second largest in Europe, a new entry on the gravure publication market is the French web-offset printer Lenglet, located close to the Belgian border. In a few years this family-owned company will be one of the major publication gravure printers in Europe with a print capacity of about a quarter of a million tons of paper annually. Since Hachette (Filipacchi) sold its printing capacity, the last integrated publisher/printer ceased to exist.

Italy

One of the major publication printing markets is Italy, despite the fact that the domestic magazine and publishing market has by tradition been quite small and concentrated to the northern part around Milan, Turin and Verona, because the publication printers have since many years been trading in the export markets, traditionally in France and the UK, but lately also in Scandinavia. In 1985, there were 20 publication gravure printers, but many were quite small and operating with outdated equipment (Gianoli 2005). The major publication gravure companies were integrated with large magazine publishers like Mondadori, Rizzoli and Ilte, although the latter was never involved in publications but concentrated on directories and yellow pages. Since 1985 most of the small printers have disappeared, others have been merged and acquired, and the publication printing market is more consolidated and there are only six publication printers left. However, these companies are much larger and running up-to-date equipment. The latest large investment is currently going on in Treviglio outside Bergamo, where a completely new large publication gravure printing plant is being built by Eurogravure, part of the German Arvato Group. When the new plant is up and running, the plants in Milan (ex-Rizzoli) and Bergamo will be closed. All publishers, except Mondadori, have shed their printing activities, and the publication gravure printers are operating in a very competitive market. Ilte is now

privately owned, and has during the last 10 years invested in considerable capacity in very modern web-offset presses whilst some of the older gravure presses have been shut down. Although some of the investments made by Ilte in commercial web-offset were made for printing yellow pages and telephone directories, the future of its gravure publication capacity is somewhat uncertain. No investments in new equipment have been made recently. The developments on the domestic magazine market with many smaller new titles and an increasing tendency to split large editions into many sub-editions have made publication gravure market limited and much more competitive. Hence, a phenomenal number of 64p web-offset presses have been installed during the last five years, according to well-informed sources (Gianoli 2005). The growth in web-offset printers since 1985 is more than 20%, and many of these are start-ups in the new millennium.

Spain

In 1985, there were ten small publication gravure printers operating. Most of them were integrated with a publisher, and one of the most prominent newspaper publishers even produced a daily newspaper in gravure, albeit in monotone (brownish colour). Most of the presses were installed in the 1960's or early 1970's and they became obsolete in 1985 and onwards. When Spain in 1986 became a member of the European Union, some foreign investors began investigating the viability of modern gravure technology for the Spanish market. In 1990, Watmough's Holding (now Polestar Ltd) began building the first gravure plant, and soon Arvato from Germany followed suit (Polestar 2005). There are three modern publication gravure plants in operation today, which are all heavily trading on the export market. One interesting development in recent years is the merger of the printing activities of Polestar in Spain and Grupo Pisa, a leading Spanish media group, in 2003. Polestar has 40% in the new entity, and it is interesting to note that this publisher has decided to retain the majority of the company. On the other hand, the commercial web-offset market was very small in the beginning of the 1980's. Almost all of the presses now operating have been installed since 1990, and these presses are among the most modern in Europe.

4.5 Changes in the UK

In the 1970's, the British publication printing industry was dominated by the British Printing Corporation and Odhams Printers in Watford. The British Printing Corporation was founded in 1964 with the merger of Hazel Sun in Watford and Purnell's and Sons in Bath, but this merger and further acquisitions were never really successful. During the 1970's, there were two giants in the European gravure publication printing industry, both situated in Watford outside London, Sun Printers (part of the British Printing Corporation) and Odhams Printers (owned by Reeds International). During the 1960's and early 1970's they were both very large in terms of employment and each had about 3 000 employees. During this time, the weekly and monthly magazines boomed, and both circulation and advertising revenues grew. Later, when commercial TV got a strong foothold in the UK, the magazines' circulation and revenues sank from year to year. Due to very powerful unions, there was very little the management could do to reduce excessive manning and rationalise the production processes.

In the beginning of 1980, Sun Printers was losing money every year and its working practices were very old and obsolete in comparison with the large continental printers in Europe. The only consolation for the local management in Sun Printers might have been that the labour situation in Odhams Printers was even worse. When Robert Maxwell decided to expand his business interests, he made a successful move when he chose the British Printing Corporation in 1980. Although his leadership in this particular company was very heavy-handed, he did not at first interfere at all in its business. He should be remembered as the one who restructured the British publication printing industry and in particular gravure publication printing. Nevertheless, within two years of having taken full control of the British Printing Corporation, Maxwell managed to strike completely new manning deals with the local unions, and the result was more or less a sensation. The gravure printing was consolidated to Sun Printers with a level of manning which was similar to that in Europe. New more efficient presses and equipment had been installed, and the company was making a profit.

The British gravure publication printing industry was radically and drastically changed by this man alone. The previous owners were incapable of making any significant changes and were often victims of the power of

the local unions. The discussion among the union representatives was of course very different. Maxwell had by pure power and energy during the intensive negotiations worn down the union representatives (*'He is the greatest wheeler-dealer we'd ever met'*) says Bill Keyes (union official cited in Bower 2002, p.342) and he continues by saying: *'He will charm the birds off the trees and then shoot them'*, (cited in Bower 2002, p.511).

In 1986 the British Printing Corporation also became involved in the printing of the Daily Mirror Group newspaper. Maxwell moved all the printing of the newspapers to a new division of BPC called the British Newspaper Printing Corporation. The new presses were erected in the former Odhams Printers premises in Watford, and by doing so he created a strike-free zone for these titles (Bower 1991, p.417). This was his final coup in beating the print unions at the Mirror.

Although the British Printing Corporation was his first important vehicle for expansion, the former publication printing division (which was re-named the Maxwell Communications Corporation) was sold without sentiment by Maxwell in January 1989. The Maxwell Communication Corporation needed a huge cash injection on order to repay some of its debts, and the division was sold to its management in a Management Buy-Out (MBO). After the buy-out from MCC, the division was later renamed the British Printing Company.

In 1998, the British Printing Company merged with Watmough's Holdings Plc to become the cornerstone of the present Polestar Group. Watmough's Holdings Plc was a privately owned group of smaller gravure printers in the northern part of England, Bradford and Scarborough. The group was quite successful and went public in 1990. The new company, formed after the merger between the British Printing Company and Watmough's, was named the Polestar Group (Annual Report Polestar group Ltd 1999). This company, owned by a private investor, Invest Corp., is one of the largest publication printing companies in Europe. The group is in 2005 investing about £ 115 million in a new publication gravure plant outside Sheffield and subsequent close some of the older plants (Annual report, Polestar Group Ltd 2005).

The newly formed alliance Prinovis of Germany, jointly owned by three of the major German publishers, is currently investing some £ 150-200 million in a new publication gravure plant scheduled to open in the spring

of 2006 outside Liverpool (Prinovis 2005). The combined investments in publication gravure capacity by Prinovis UK and Polestar will certainly have a great impact, not only in the UK but also on mainland Europe, because many continental publication gravure printers will find the export trading to the UK increasingly competitive.

Commercial web-offset has been active since the beginning of the 1980's, because the domestic publication gravure industry was considered rather week and old-fashioned. Through the intervention of Robert Maxwell, the gravure industry was given a new structure and modernized. The British web-offset industry pioneered in developing SC (Supercalendered) magazine paper grades together with the Nordic paper industry. The web-offset industry is the third largest in Europe, only challenged by France and Germany. As mentioned earlier, the commercial web-offset industry – not only in the UK - will be challenged by the huge investments in new gravure technology currently being made by Polestar and Prinovis.

4.6 Structural changes in Europe - a summary

There have been some dramatic changes in the business environment of the industry during the last two decades due to technological changes. These changes have made it possible for publishers to dramatically reduce the entry barrier for new titles and editions, but more importantly, to change the previous customer/print buyer relationship with the printing industry. The quality issue is no longer an issue, as print quality can be regarded as a commodity or else as a relative factor only assessed and/or perceived by the customer. What the customer accepts is good enough quality. The smaller colour gamut (or colour space) in web-offset does not concern most of the print buyers, only the professional printer. What does count, however, is consistent quality and good colour register, and of course a competitive price level. It seems, however, that the number of commercial web-offset printers has increased by about 10-20%, although on each site the average production capacity is almost twice as high as it was 20 years ago. This means that more capital investments have most likely recently been made in web-offset. New presses are installed with up-to-date technology, printing 32-64 page signatures and they are much faster. This will be further investigated in future investigations, as well as the future demands for the publication printers.

5. Summary of included papers

The digital revolution has changed the prepress operations of handling pages in magazines, newspapers or general printed matter into a commodity task, moving not only the control but also the execution of prepress operations from the printers to the publishers and print buyers. On the surface these events may not look very dramatic, but in reality they have caused the previous strong bonds between printer and print buyer/publisher to disappear. The previous large prepress departments in the printing works with specially trained craftsmen handling photographic films, such as scanner operators, retouchers, typesetters, planners and plate makers have vanished and only a few specialists have been able to retain their jobs.

Another effect is the low entry barrier for producing many more pages and indeed new titles. These changes did not, however, happen without implications. In many countries and/or companies with powerful print unions, there were long, bitter battles between publishers and other owners of the print capacities and the unions, and one the fiercest battles happened between 1982 and 1986 in the UK. The story of Robert Maxwell (and of course also Rupert Murdoch) is closely connected to these events and is presented in the second paper. In other countries, similar patterns have emerged, in many cases as bitter as those in the UK, but with less publicity. Visiting the major publication printers today in Europe, you may find whole storeys empty of any operation, which are witnesses to the "good old days", when the prepress operations occupied these premises with many hundreds of specialists.

5.1 Converging technologies in the prepress from 1980-2003

The first paper in this thesis is devoted to the technical developments in prepress technology and deals with the technical convergence which has taken place during the last 10 to 15 years. A survey approach has been used as the scientific methodology with extensive literature searches in various technical scientific literature databases. It is suggested that there have been three paradigm shifts during the 20th century. The first shift was at the beginning of the 20th century, when the first modern typesetting technology was introduced. The new technology, the first major step since the invention of loose type by Gutenberg in the 16th century, became the most important contribution to the mass market circulation of news-

papers, magazines, textbooks, books and other publications during the years to come. A supervening necessity of social change was urgent, and there was no suppression from competing technologies. Previously newspapers were very thin, because manual typesetting, which was slow and expensive, made it impossible to produce more than a few pages every day. Books and textbooks were expensive to produce, and only a minority of the population could afford to buy them. With the new technology, textbooks became available for large circulations, which together with school reforms in most civilized countries quickly spread knowledge and information among their citizens.

The line casting technology was more or less unchanged during most of the 20th century, and only a few technical changes, such as the introduction of punched paper tapes after the Second World War, increased the productivity. A major concern for quality was the excessive wear of the brass matrix, which made frequent and expensive maintenance necessary. In the beginning of the 1950's, many attempts were made to replace the hot metals with other methods such as phototypesetting. The first attempts were more like an emulation of the line casting machines, but other technologies were soon introduced.

A major step forward came when the first affordable computers were introduced onto the market, such as the PDP-8 from DEC in 1964 and later the PDP-11 in 1970. Again the supervening necessity was created because the competition among publishers was extremely hard. But now there were many forces which wanted to suppress the new technology. The major force was the traditionally very powerful labour unions, particularly those organizing the labour in newspaper production on Fleet Street, but also in Sweden and Denmark. Their influence started to diminish during the second paradigm shift and was more or less completely over a decade later.

With the entrance of computerized composition systems for newspaper and other publishers, the first step towards the second paradigm shift was taken. This was the transfer from all analogue technology in producing text (as hot metal), line works and images to a digital technology. Colour separations made by electronic drum scanners became a standard procedure during the 1970's. A major breakthrough occurred when Scitex Corp. showed the first colour page make up system (CEPS) – the Response system, which was quickly followed by other major suppliers: Dr

Hell and Crosfield Electronics, both leading suppliers of digital drum scanners. The graphic arts industry went digital early in 1980.

A supervening necessity evolved towards the end of the 1980's when publishers were looking for cheaper production methods. The systems presented by the major suppliers were extremely expensive, and yet there was no simple technique available for exchanging digital information between different systems. The law of suppression held up the introduction of the third paradigm shift, but the Apple Macintosh and Adobe PostScript slowly became the major technologies in the digital age of publishing. The printing industry stopped using analogue photographic films about 15 years ago and became totally digitally with the advent of desk-top publishing, using PostScript and affordable software packages like Adobe Photoshop, Aldus PageMaker and Quark Xpress.

Today, Apple is still in the market, small but influential in the publishing world, but Adobe – the inventor of PostScript and PDF technology – is the new giant on the world market. Never before has a company had such a position in the graphic arts industry. It can be shown that the investment cost of a workstation for publishing operations (creating pages - manipulating images, creating lay-outs and text etc.) is now only about 5-10% of the level in 1990. The rapid decrease in the cost of computer hardware and the shrink-wrapped software programmes for editorial work has contributed to these phenomenal developments.

Previously, many customers were complaining about the lack of competition and industry standards in the front-end market. Now, however, Adobe has created a de facto world standard with the PDF-process, which is also backed by ISO. A new monopoly in front-end technology has been created by default. Never before has a single company been in such a position in the graphic arts industry. This is like falling from the frying pan into the fire!

5.2 Leadership in the media – about Robert Maxwell – a study of power in leadership

The concept of Power in Leadership and Management has been much debated in recent years. Nevertheless, power in both public and private companies is still much in use, although disguised in other aspects of Leadership. Power is the capacity to influence the attitudes of people in

the desired direction, and to make them execute orders they might not otherwise obey. The concept is needed to understand how people or managers may influence each other in organizations. Leadership is related to power because it is dependent on the level of influence a person may have in an organization. A leader with little power will have little or no influence or authority, and authority is the right to influence others in a specific way. Thus, it is an important basis for influence in formal organizations.

This paper attempts to show how the late Robert Maxell, regarded between 1980 and 1991 as one of the leading publishers and media owners in the world, used power to overcome most of the obstacles on his path to success. Maxwell was always regarded as an outsider by the establishment in the UK, but he managed by his sheer energy, personal charm and persuasion to be financed by the leading banks and financial institutions in Europe and overseas.

During 1991 his debts grew and finally became too large, and he was obviously unable to repay his debtors. On November 5th 1991 he was found dead floating in the water off the Canary Islands, apparently having fallen overboard from his personal yacht the *Lady Ghislane*, but the real cause of his death has never been fully established. Soon afterwards, his empire collapsed and it was discovered that for several years he had illegally used the pension funds to pay off debtors. In May 2001, some of the leading financial institutions and audit offices were fined for gross negligence in dealing with these matters, and about two thirds of the total embezzled money was repaid to these pension funds. In the end, he was given a state funeral in the state of Israel attended by some of the most influential leaders in the country.

Despite being considered a thief and a fraud, he should nevertheless be remembered as someone who was, between 1980 and 1989, personally very much involved in the restructuring of both the publication printing and the newspaper industries in the UK and overseas.

5.3 Benchmarking gravure cylinders vs. web-offset plates

Benchmarking is a technology which is used to compare certain industrial processes. One excellent example is the automotive industry in Europe

and Japan, where manufacturers are comparing the assembly time (in man-hours). It has been shown that the assembly time during more than a decade has been reduced by 60-70% among European car manufacturers, closing the gap to the previous superior Japanese manufacturers. A similar approach has been used in this study. The objective of this paper was to determine what factors were relevant when comparing publication gravure and web-offset printing, and whether this process was fundamentally different in 1985 from what it is today.

With an abundant number of players marketing and selling Computer-to-Plate (CTP) solutions, there is a tremendous competition on the world market. Hence, most industry observers have the opinion (or belief) that producing web-offset plate is today much cheaper and easier than processing gravure cylinders. The gravure cylinder processes are still perceived to be very expensive, cumbersome to handle and processed with an old fashioned technology; to the great disadvantage of the gravure printing process.

Often forgotten is that the recent web-offset plate technology is in fact emulating the much earlier technology developed specifically for publication gravure, going directly from the digital file to the image carrier. The big difference is that modern software, PC's and networking technology has made the direct digital interfaces very much cheaper for the whole printing industry than it was 20 years ago for the first pioneers. One of the major benefits of the digital process is the improved reliability of the engraving process, and gravure cylinder proofs are no longer necessary.

This paper presents the technical developments in recent years with regard to the processing of offset plates and gravure cylinders. In 1985-86, a comprehensive study of the publication printing industry was carried out by the European Rotogravure Association in Munich. This study was the first of its kind and no comparable study has, to the author's knowledge, ever been compiled. A part of the study concerned the relative manufacturing costs of a gravure cylinder and a web-offset plate, calculated per A4 page.

It has been possible to retrieve some of the data from the archives of ERA, but all the sensitive numerical data is from my own personal archives. The agreement was that all numerical and sensitive data were to

be sent to me personally and that it should not be possible for them to be accessed by anyone else. Following this procedure, all the data have been impersonalised in such a way that no individual company can ever be identified. The same procedure has been taken when collecting new data for this study. In this way, total confidentiality is assured.

The main emphasis has been on a quantative analysis of the present situation in the industry. However, a broader audience has been invited to participate in a qualitative approach extended with personal interviews. The interviewees have been selected among the major supplying companies in Europe. In this context there are about 4-6 leading suppliers to the publication printing industry (plate and printing cylinder processing equipment manufacturers). Almost the same number of printers was involved in submitting information, despite the fact that the structural changes in the industry have reduced the number of potential replies.

Hence, in 2005 a hypothesis was formulated; the relationship from 1985/86 of the processing costs (calculated per A4 page size or m^2) for a gravure cylinder and a web-offset plate has significantly deteriorated to the disadvantage of gravure. A second hypothesis suggested that the lead-time from receiving the data for a new job until the first accepted printed copy is significantly shorter in web-offset than in gravure publication printing. In order to compare the two studies, a statistical analysis of a European macro-economic index (an index showing the development of the price of publishing and printing) from the countries involved, has been used.

In this paper it has been proved that the hypothesis is falsified, although the scatter among those participating was quite large. However, the lead-times have in both processes improved significantly, but the web-offset plate processing is still much faster. In cooperation with the major suppliers of processing gravure cylinders and web-offset plates, an investment model was created. Using the best available technology (or best business practice) it can be shown that the gravure cylinder process can be very much improved both in cost and lead-time in relation to previous studies. That implies that many publication gravure printers could improve their competitiveness by investing in modern cylinder process equipment and automated cylinder handling.

Another interesting fact was that the processing costs for both processes have decreased by almost 70% since 1985. Unfortunately, it seems that these cost savings have been transferred to the print buyers, and have not improved the profitability of the publication printers.

6. Conclusions

In order to provoke changes in an industry, a leadership with vision is needed (Paper II). The vision needs power to make the necessary changes, and legitimate power can be found in most family-owned companies and in the European publishing market there are many family-owned or family-controlled companies, such as in Italy, Switzerland, Germany and Scandinavia. During the last 20 years structural changes both in publishing and publication printing industries have been seen in most European countries. There have been a number of mergers and acquisitions which has lead to more consolidation; fewer but larger identities. One of the driving forces in the consolidation has been the separation between publisher and printer, which in turn has been supported by the abundance of printing capacity. The behind this driving force was the abundance of print capacity. 15 years of continuous investments in new European publication print capacity - particularly in commercial web-offset (ERA List of Presses 1987 and 2005) - have met the demand for most print buyer. Hence, print capacity has not been scarce for many years, and the print buyer has had the opportunity to pick and choose. The core business of the publisher has become publishing, and not printing, the products. Following that the ownership of the production process seems less attractive, those publishing houses with integrated production are no longer owing its printing facilities process in most of the European market

In Sweden, the Bonnier Group, which once owned one of the largest publication printing company in Scandinavia, disinvested and outsourced its production already in the late 1980's. Germany seems to one of the last to change its structure, and not until recently did three of the major publishers jointly create the Prinovis Group, and subsequently outsource their printing plants. Nevertheless, there have been a number of personalities in the printing and publishing industry but few as flamboyant as Robert Maxwell (Paper II) and Rupert Murdoch who were changing the publication printing industry in the UK in the early 1980's. Other family-owned companies are Mondadori and Rizzoli in Italy, Ringier in Switzerland, and Aller in Scandinavia which all have set their vision on a change. Whether or not these companies will retain their printing capacities is too early to say, but the European market trend has been obvious for the last 15 years – publishers are keeping printers at an arm's length distance.

Has the publication printing market become a buyer's market? During the last 20 years, prepress technology has changed. The advent of desktop publishing in the beginning of the 1990's gave the print buyers the tools they needed for their work (Paper I). s. An integral feature of desktop publishing was the editorial control of the production workflow. The software packages for both editorial and image manipulation work available on the market became very reasonable in price, and therefore the entry barrier for new titles and products became very low. In the smaller language markets, like Scandinavia, the language barrier ceased to exist, and the print business became global, or at least pan-European.

However, the driving forces of the changes in prepress technology were many:

- The primary force was of course the investments and running costs of the previous proprietary prepress systems marketed by Dr Hell, Crosfield Electronics and Scitex Corp. With the advent of PostScript technology followed by affordable editorial software packages, the market for large editorial systems collapsed (Paper I).
- The second driving force was the editorial control of the workflow. The publisher or catalogue producer was now able to control the workflow, and this made the printer more dependent on the ability of his client to deliver correct data files.
- The third driving force for the print buyers is their own media market. The media market has changed in most European countries, and advertising expenditure in periodical products and/or catalogues now has strong competition in other consumer-oriented channels, such as commercial television, video, internet etc. Hence, the manufacturing and distribution costs must be well controlled.

Digital technology has made printing forms very less expensive today than they were 20 years ago (Paper III). An industrial process which was previously manual, controlled by craftsmen, is today fully automated. There is hardly any commercial web-offset printer in Europe who is not using the latest Computer-to-Plate technology (CTP) today. Fast, high productivity, reasonable inexpensive and with many competing manufacturers makes this technology very attractive for the printer. Not until recently, however, has the publication gravure industry felt the challenge, and new fully automated cylinder processing systems have come to the market. Nevertheless, there are many smaller publication gravure printers

which may not be able to afford renewal of its equipment but badly need to be more competitive.

The conclusion is that due to the techno-economical factors, which are dominating the publishing and catalogue industry; the European market has become a buyers' market today!

The fast digital revolution in the prepress area has put the gravure publication printing industry under pressure. Some of the larger European publication gravure printers have been challenged by their customers to invest in even wider presses, because the production cycle can be shortened and larger signatures can be produced more quickly. Hence, most product developments in recent years made by gravure press manufacturers and cylinder process equipment have gone into the super-wide presses, today 3.8 m or wider, focusing only on the larger markets in Europe.

It might be suggested, however, that publication gravure printers have suffered from marketing myopia (an expression coined by Theodore Levitt in 1960 (Levitt 1960). He suggested that companies, or even sometimes a whole industry segment, can suffer from marketing myopia in the sense that they do not understand what market they are working in. His classic example was the US railway companies who lost the battle for travellers in the middle of the 1950's in the US to the emerging air transportation industry. The railway industry thought they were in the railway business, instead of realising that they were really in the transportation business. In this case, one may suggest that publication gravure printers are not in the publication printing industry; they are instead in the media and communication business.

The gravure publication printing industry has to make sure that it is competitive in this particular business; by not giving away some of the most obvious assets such as format flexibility, larger colour gamut, print quality and speed. It should be noted, however, that there are some exceptions when gravure printers decided to invest in complementary web-offset capacity in order not to lose their relative market share. Major gravure publication printers in Germany, France, Italy and the UK are some examples. However, more frequently, publication gravure companies in the smaller European markets have closed their gravure operations and switched to web-offset.

If the present market conditions are prevailing also in the foreseeable future, it will continue to be a buyers' market. So what conditions are then to be expected? Among the larger print buyers in Europe, it is customary to buy their own paper, and supply the necessary quantities to the printer of choice. That means that the average publication printer will have even less possibilities to use the leverage of paper to enhance the profit of the job.

Further consolidation in the European market will certainly happen. The only question is; when and by whom and which countries or companies are going to be affected the most? The printer has to survive on his ability to provide excellent customer service; to efficiently process offset plates and/or gravure cylinders, to operate the press room in a flexible and efficient way, to deliver on demand and to produce adequate quality on the paper substrate chosen by the customer, and finally to offer the customer the right price. Not always an easy task in a highly competitive market, considering all the new environmental and/or labour legislation. Many may ask themselves: what is the future going to look like for a publication printer?

7. Further research

Some research questions remain to be investigated further in the European publication printing industry. My additional work will focus on some of the driving forces behind the growth of web-offset printing, and will elaborate on the changes that have been taking place during the recent twenty years, and changes that can be expected.

I will also investigate the following research areas:

- The present market conditions and product specifications in Europe in comparison with those 20 years ago
- An in-depth investigation of the current total manufacturing costs for publication gravure and web-offset subdivided into different paginations (from 32p up to 96p)
- A technology forecast for the coming decade
- A European market overview from the perspective of the customer – the publisher and the print buyer

My research focus will now concentrate on the following research questions; the investigation of the market conditions and product specifications; the investigation of the total manufacturing costs in the press room. New hypotheses must be formulated; have the market conditions deteriorated; have the product specifications been changed; from what pagination is web-offset printing more competitive?

The objective is to compare the manufacturing costs in publication gravure and commercial web-offset printing, and to investigate the print run costs and break-even conditions for some well defined signatures. A comparison will be made with the results from the previous study from 1985, which showed that a signature of 48 pages or more (in A4 size) was always cheaper to produce in gravure than in web-offset.

A new approach to defend the mid-size markets in Europe might be needed, and this will be an area for future research. It is not unlikely that publication gravure printing will only be competitive on the larger European markets, and hence that there will be no publication gravure printers in the smaller countries in Europe.

Finally, a market research will be carried out concerning the future demands for the European publication printing industry, and will among other thing be dealing with the following research questions. What do publishers and print-buyers have to say about their perception of the future for publication printing, and what do they want to buy? Is there any future for publication printing in Europe, or will other media be better positioned to meet the expectations of publishers and catalogue buyers?

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