Is the medium the message?

THE IMPACT OF DIGITAL MEDIA ON THE NEWSPAPER CONCEPT

Sara Leckner

Abstract

The impact of digital (new) media has caused both challenges and threats to newspapers' continuing existence as a profitable and influential mass medium. While this is not the first time in history that new media appear to be challenging the future of the newspaper medium, from one perspective digital media offer not only direct competition, or alternative ways to produce and deliver news, but also possibilities for convergence, for making new media part of the traditional newspaper, inducing whole new possibilities for publishing. From another perspective, the newspaper medium is an old concept; a powerful mass medium with very profound consumption patterns, strongly associated with its traditional output medium: ink-on-paper.

The purpose of the present work has been to examine the impacts digital media have on the old, well-established newspaper medium, and what consequences these impacts have for the future of newspaper as a mass medium, that is, is the medium the message? In order to achieve this aim, the present work has been carried out from three different angles: *digital media, publishing* and *reading behaviour and presentation factors*. The areas have been examined using several methods: instrumental experiment, eye-tracking experiment, secondary analysis, and case study design.

Newspapers' 'to be or not to be' depends, in a theoretical sense, on what media constitute. The medium is the message in the sense that, in the definition of a mass medium, the strength of the newspaper message is that it is recognized as the newspaper concept. It is not, in that the message per se is dependent on the medium it is reproduced on, as a newspaper can be considered a newspaper even if presented on a digital medium, yet the specific way the content is presented will always depend on the technology and characteristics of the chosen output medium. Thus, while defusing the output medium's significance for the concept, the strength of the newspaper, and its industry, lies in what hitherto constitutes the message: accurate, credible, serendipitous, and diverse content, but which is continuously adapted to the technology of the output medium, thus benefiting from it and further strengthening the developed, digitalized newspaper concept, or what will become of it. The newspaper industry has great potential to differentiate itself in a world where news is becoming increasingly commoditized, though it must further emphasize its power, which lies in the long-defined 'old' newspaper concept. Moreover, the industry must be aware of the fact that this refashioning and adaptation is a slow process.

Keywords: *Newspaper publishing, newspaper industry, strategy, convergence, new media, digital media, electronic media, display technology, media technology, presentation-style, user interface, newspaper layout, reading behaviour, perception, newspaper consumption, consumer needs.*

Acknowledgement

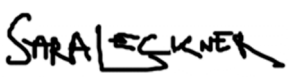
"What does not kill you makes you stronger" – a motto applicable to the present doctoral period of study – I am glad to still be alive. Several persons have, during different times and in some way or another, helped me to find the light in the very far tunnel filled with dragons and dungeons.

In alphabetical order: Thank you, for…!

Ester Appelgren: Giggles, tears, and a shared passion for TV-series
Mariann Berggren: Our nice coffee talks in the mornings
Nils Enlund: Valuable comments on the "kappa"
Trille Fellstenius: More beers and less training
Leif Handberg: Providing a spice to the to the particular KTH environment
Björn Hedin: Being my personal change agent and my GRU dealer
Alex Jonsson: The ability to pull an e-paper out of your sleeve
Arild Jägerskogh: All the nice compliments!
Christer Lie: For always taking the time
Siv Lindberg: All the time you put into helping me
Ingrid Melinder: Being a cool lady, however, with whom I do not always agree
Stig Nordqvist: For providing me with an opportunity
Jenny Sundén: Knowing where the scientific cupboard goes, and the patriarchy one f.t.m.
Marko Turpeinen: Being my adviser the last year, helping me to tie the work together

T2F, TU, KTH and my mom for funding different parts of the doctoral study
Utility providers – Apple Inc., Framkom, Network Innovation, PARC, STFI-Packforsk, and several national and international newspaper companies: For lending time, knowledge, and/or equipment.

Last and most, I ♥ You:
All my lovely friends: That you still like me despite all I have done the past years is work
My family – Bling, Ingegerd, Bosse, Åsa, Margaretha, Sören, Pelle and Putte: For most things!



Sara Leckner, Stockholm Aug 2007

List of papers

The work presented in this thesis has been produced between the summers of 2003 and 2007, and has been published in the following publications:

PAPER I Leckner, S. (Aug 2006) LCD hardware characteristics of relevance for colour-critical work – Part I. Fundamental aspects of monitor quality *Journal of Graphic Technology* **3**(1) pp. 1-16

PAPER II Leckner, S. (Feb 2007) LCD hardware characteristics of relevance for colour-critical work – Part II. Aspects of importance for calibration and characterisation *Journal of Graphic Technology* **3**(3) pp. 105-118

PAPER III-IV Leckner, S. and Appelgren, E. (2007) E-paper news publishing –Strategies for the product *and* Strategies for the production *Nordicom Review* **28**(2)[1]

PAPER V Leckner, S. (Submitted for publication) Presentation factors affecting the reading behaviour in readers of newspaper media

PAPER VI Leckner, S. (Submitted for publication) Reading behaviour in readers of newspaper media

PAPER VII Leckner, S. (Preliminary draft) An eye-tracking study on the influence of media technology on behaviour patterns in newspaper reading

In 2004, a licentiate thesis was published, Paper XI, including work produced between 2000 and 2003. The licentiate thesis had a different focus than the work presented in the present thesis. The licentiate thesis included five papers, of which Papers VIII-X are not part of the present thesis, whereas Papers I and II are included, but only after considerable revision.

PAPER VIII Leckner, S. and Nordqvist, S. (2002) Soft Proofing using LCDs - Case Newspaper Workflows *Proceedings of the TAGA 2002 Conference* Ashville USA pp. 367-378[2]

PAPER IX Leckner, S. (2002) Reproduction of display images *Proceedings of ICIS'02 Conference* IS&T/ISJ Tokyo Japan pp. 443-444

PAPER X Leckner, S. and Nordqvist, S. (2003) Tolerance levels for standards in premedia colour workflows *Proceedings of the TAGA 2003 Conference* Montreal Canada pp. 90-108[2]

PAPER XI Leckner, S. (2004) *Soft proofing using Liquid Crystal Displays – colour management for media production workflows* Licentiate thesis **TRITA-0104** NADA Media Technology and Graphic Arts Royal Institute of Technology pp. 1-122

---

[1] This publication is a part of a larger project, and both authors have planned and carried out the data collection. The specific work on the publication – specific research questions, data analysis, and writing – has been done entirely by Leckner.

[2] The major part of the work has been done by Leckner. Nordqvist provided the industry contacts and participated by commenting on the final draft.

Content

CHAPTER 1

INTRODUCTION

KRAMER: (Moving back to the other side of the booth): You're wasting your life!
GEORGE: I am not! What you call wasting, I call living! I'm living my life!
KRAMER: O.K., like what? No, tell me! Do you have a job?
GEORGE: No.
KRAMER: You got any money?
GEORGE: No.
KRAMER: Do you have a woman?
GEORGE: No.
KRAMER: Do you have any prospects?
GEORGE: Noo…
KRAMER: You got anything on the horizon?
GEORGE: Uh...no.
KRAMER: Do you have any action at all?
GEORGE: (Very miserable) No.
KRAMER: Do you have any conceivable reason for even getting up in the morning?
GEORGE: I like to get the Daily News!

The above is taken from the Seinfeld episode *The Keys* (Charles, 1992), in an attempt to illustrate the importance of the newspaper medium in people's daily lives. However, this long established consumption pattern is changing due to what is popularly termed 'the changing media landscape' – the change from analogue one-way communication mass media to 'new media technology' – individualized and fragmentized consumption of digital two-way communication media. For 'old' media such as the newspaper, and the industry producing it, this change constitutes a road junction, determining its future and its implication as a concept.

1.1 The development of newspaper media

The reason this change is such an upheaval, is that the newspaper medium is one of the oldest mass media. About a hundred years after Gutenberg invented the printing press in 1447, newssheets with news related to trade and commerce were circulated. In the first half of the 17th century, newspapers appeared as regular and frequent publications, and in the latter half of that century, the content started to shift towards local issues (WAN, 2004). However newspaper-making was a slow process until the middle of the 19th century, when inventions such as the telegraph allowed information to be transferred within minutes, which enabled timelier reporting. Then, the typesetting machine and efficient printing presses made the publishing process much faster, thus triggering a growing demand for reading material and display advertising, which contributed to an explosion of printed media (Fidler, 1997; WAN, 2004). This underpinned the newspaper medium's establishment as a true mass medium towards the end of the 19th century (McQuail, 2004).

The period from 1890 to 1920 is often considered the 'golden age' of the newspaper medium (Fidler, 1997; WAN, 2004).

Nevertheless, it is not the first time in history that 'new media' have challenged the position of the newspaper medium. In 1920, a new medium was introduced in the form of broadcast radio, and like the new media of today, the technology was relatively low-cost, which created the first buzz that printed newspapers were threatened by electronic media (Fidler, 1997; WAN, 2004). To meet this challenge, newspaper publishers launched some of the world's first radio stations. However, the publishers soon discovered that radio broadcast was expensive and basically an unrewarding endeavour for a newspaper-related venture, and the stations were sold when the novelty wore off (Fidler, 1997). Instead, the newspaper medium was developed to include special sections, weekend magazines, comic pages, timetables on radio programs, and in-depth journalism.

A few decades later, in the middle of the 20th century, the newspaper industry was confronted with yet another new and even more powerful medium: television (WAN, 2004). Once again, the death of printed media was predicted. By the end of the 1960s, many publishers feared that the prediction might come true this time, when sharply raised costs for labour and paper, aged technology and processes, and increased competition with television for advertising revenue began to cut deeply into the profits and threatened the existence of many newspapers. However, new computer and printing technologies, introduced in the 1960s and 1970s, made it possible to streamline the labour-intensive production processes, and by the beginning of the 1980s, most newspapers had once again undergone substantial changes in content, design and technology (Fidler, 1997; Picard and Brody, 1997). Throughout most of the 1970s and 1980s, many newspapers were more profitable than they had been since the 1920s (Fidler, 1997), but that phase ended in the late 1980s, when the era of digital delivery of newspaper content started. Several attempts at digital delivery of news were made in the late 1970s and 1980s (Fidler, 1997; Boczkowski, 2002), but it was not until around 1994-1995, when the popularization of the World Wide Web (WWW) began (e.g., Molina, 1997; Sparks, 2000; Boczkowski, 2004), that electronic newspaper publishing started to take off. Now in 2007, about ten years later, the electronic newspaper is established, and other new digital media are slowly coming about.

1.2 Research aims

The impact of new media has caused both challenges and threats to newspapers' continuing existence as a profitable and influential mass medium. The reason can be regarded from two perspectives. While this is not the first time in history that new media appear to be challenging the future of the newspaper medium, digital media offer not only direct competition, or alternative ways to produce and receive news, but also possibilities for convergence, for making new media part of the traditional newspaper, inducing whole new possibilities for publishing. From another viewpoint, the newspaper medium is an old concept; a powerful mass medium with very profound consumption patterns, strongly associated with its traditional output medium, ink-on-paper. These perspectives raise questions about what will happen to the newspaper concept and its implications, if it is no longer associated with its original medium: What in fact constitutes a newspaper, how do digital media impact this concept, and what do these media bring to the future of the

newspaper as a mass medium, as well as the industry that produces it? The purpose of the present work has been to examine the impacts digital media have on an old, well-established mass medium, which is strongly associated with analogue technology, and what consequences these impacts have for the future of newspaper as a mass medium, that is, is the medium the message[1]?

Specific research questions have been:
- If a newspaper is no longer printed on paper, to what extent is it still a newspaper?
- How does the newspaper industry react to the emergence of digital media?'
- How do digital media and the newspaper concept develop in relation to each other?
- How do digital media affect the consumption of newspapers?
- What can be said about the newspaper of the future?

The present work aims to contribute to the discussion of new media theory in general, targeting other scholars, and to the discussion of the future of the newspaper medium specifically, explicitly targeting the newspaper industry and its aim to remain powerful and profitable. As the aim of the industry is to gain and keep consumers, implicitly the work also targets the newspaper consumers.

1.3 Overview of the included publications

In order to achieve the above aims, the present work has concentrated on three areas: (1) *digital (new) media* – display technologies, (2) *publishing* – strategies for newspaper products and their production, and (3) *reading behaviour and presentation factors* – how newspaper media are consumed depending on media and presentation. The present work builds on seven publications, Papers I-VII, dealing with one or more of these areas. The relationship between Papers I-VII is illustrated in Figure 1.1.

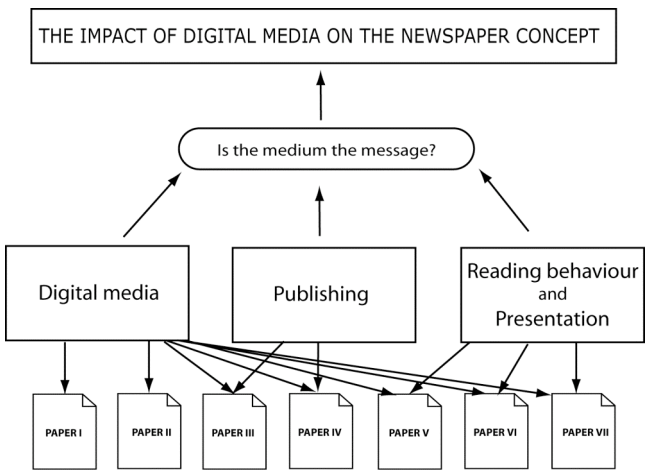


Figure 1.1 Relation between the publications and the areas of investigation.

[1] Refers to the title of the popularly quoted *The medium is the message* by McLuhan *et al.* (1967), although the present work does not target McLuhan's ideas in particular.

(1) *Digital media*
The usability of the hardware, the reproduced content quality, and the readability of digital media depend to a great extent on the technical characteristics of the output device. For this reason, the two most common display technologies in relation to electronic newspapers have been examined. Papers I and II, ***LCD hardware characteristics of relevance for colour-critical work, Part I and II***, aim at examining technically fundamental aspects of high-quality displays, displays sufficient for cross-media comparison and professional image reproduction. The objectives have been to determine whether liquid crystal displays (LCDs) are adequate for high-qualitative reproduction, what specific characteristics LCDs exhibit in comparison with the traditionally most commonly used display technology, the cathode ray tube (CRT), and whether these characteristics are on a par with the manufacturers' specifications. Colour[2] has been a main factor of investigation, as its reproduction accuracy is a good measure of display quality.

(2) *Publishing*
Digital media increase the availability of news media and the convenience for the consumer and decrease the dependency on the media platform and time of publishing. Though print newspaper dominates the newspaper market, multiple channel publishing is becoming increasingly important, as the media market is rapidly changing and the competition between media producers is intensifying. The newspaper industry's views on the future of publishing have been examined in two parts, published as one publication, Paper III-IV, and entitled ***E-paper news publishing – strategies for product and production***. The purpose has been twofold: First, to investigate what strategies the newspaper companies envision for a potential e-paper publishing channel: its target groups, the technology and design of the product, and its production and distribution. Second, to model how an e-paper newspaper product can be produced. The objective has been to examine the conditions that would enable the e-paper medium to become viable as a newspaper-publishing channel, in relation to existing channels such as print and online.

(3) *Reading behaviour and presentation factors*
Independent of newspaper media, the content should be cognitively undemanding to partake of and it should achieve immediacy. This includes readability, usability and convenience, i.e., independent of newspaper media, the content must be easy to read, to overview, and to navigate in, in addition to maintaining the brand identity of the newspaper and the uniqueness of the output medium. These factors are largely dependent on how the news product is presented in the output medium. Paper V; ***Presentation factors affecting the reading behaviour in readers of newspaper media***, Paper VI; ***Reading behaviour in readers of newspaper media***, and Paper VII; ***An eye-tracking study on the influence of media technology on behaviour patterns in newspaper reading***, examine these aspects. The publications aim at identifying how content is consumed – viewed, read, and/or used – in relation to output media. How the media technology, and by extension the presentation-style, affects the newspaper consumption experience, and to what extent newspaper presentation styles in digital media are adopted by consumers. The objective has been to gain knowledge about where the newspaper concept is heading in the near future – to understand whether the traditional definition of a newspaper remains useful, or whether other forms of news mediation might replace the newspaper medium.

[2] Colour theory is not described here, but can be found in Leckner (2004).

1.4 Thesis outline

The remaining chapters are structured as follows: **Chapter 2** introduces theories of science and methodology, and specifically describes the methodology and methods applied in the publications. Chapters 3 and 4 provide the frame of reference, including such content that is not specifically covered in the background parts of the publications. **Chapter 3** presents the theoretical framework and **Chapter 4** provides a background to the current newspaper market. **Chapter 5** presents the scientific contributions of the present work, including a summary of the major findings from Papers I-VII, a discussion tying the work together, and the final conclusions. After Chapter 5, a list of **References,** and the included publications, **Papers I-VII,** can be found.

CHAPTER 2

METHODOLOGY

Philosophy of science – the foundations, assumptions, and implications of science (Andersen, 1994:21: Knudsen, 1994:96) – is not easy to grasp. Nor is *methodology* – the concrete and direct means of producing scientifically valid knowledge (ibid.), which is an essential part of the philosophy of science. Ideas about what is true or false in the philosophy of science vary depending on the scientific approach. For example, the idea of methodology is largely the same for all scientific disciplines, but all disciplines have their own methodological challenges, hence their own ways of applying this idea. Moreover, all scientific work is dependant on the time and society in which it takes place (Kuhn, 1996). What constitutes 'good science' at one time or in a certain social environment may, at another time or in another society, be regarded differently. Historically, scientific methods have been developed discontinuously (Andersen and Gamdrup, 1994a: 68).

Media technology is a young research discipline. Its research paradigm[1] has not yet been explicitly established; it works in a wide area within media studies, and in many cases is more or less multidisciplinary, integrating areas such as economy, mass media and communication, and psychology, but generally with a strong component of engineering science. This affects the methodological framework in several ways: (1) as research on media technology accesses and documents various contexts of media, it can be methodologically complex (Jensen, 2004), involving both qualitative and quantitative methods, and (2) there is no pronounced tradition concerning which methods are to be used, but dependent on the nature of the particular problem studied. Thus, based on the existing literature in media studies, it is difficult to find a relevant methodological approach for technical research. Confusion occurs because media science and communication largely have been occupied with social and cultural science, which share a common belief that 'media research' is always dealing with a social context (human behaviour). This is not necessarily true in media technology, and this uncertainty is to some extent mirrored in the discipline of media technology and the methods used in research in the area. Further grounds for confusion include the fact that many authors of methodological literature use different terms for the same procedure, and their ideas are often biased as a consequence of their specific scientific training. Established analysis methods for qualitative research are especially vague. However, from a positive angle, it can be argued that the above factors provide the media technology researcher with a great deal of freedom in conducting research, as well as a drive to gain knowledge about methodological ideas and how to use different methods. Moreover, this situation might not be exclusive to media technology, but also apply to other disciplines looking at new technologies, such as information technology.

[1] The scientific ideal within a certain discipline is commonly called a paradigm (Kuhn, 1996).

2.1. Theories of science and methodology

The word *science* means organized knowledge (Gummesson, 2000). The difference between "scientific" knowledge and "common" knowledge is that scientific knowledge is not based on beliefs, but on theories. In order for a theory to constitute scientific knowledge, it has to be true, or believed in, but what is true depends on several things. There are often several theories about one phenomenon, and no straightforward way to say what is true and what is not, as an objective world may not exist, or at least may not be available. Thus, justification of the phenomenon under study may differ (Hartman, 1998:93).

The term *theory* has been used rather loosely in mass communication[2] studies, according to Lacy and Niebauer (1995). It often means a single hypothesized relation between two variables. Lacy and Niebauer (1995:4) and Johansson (2003:54) define theory as a set of explicit definitions and systematically related statements that explain why and how events and behaviour occur, a statement about science that implies considerable evidence, but not complete uniformity of findings (a law) (Shoemaker *et al*., 2004). A theory should be more than a *hypothesis*, which is an assumption, a linguistic clause in which various statements are placed in relation to each other (Patel and Davidson, 2004), that requires testing (Shoemaker *et al*., 2004). The key to distinguishing theory from pretheory, according to Lacy and Niebauer (1995), is that a theory must have more than one proposition and/or hypothesis and that the statements must be related to some form of logic. The theory should also explicitly define the terms it includes. A good theory not only describes past and present situations, it also predicts the likely outcome of future events (McCombs and Nolan, 1992). However, according to Lacy and Niebauer (1995), mass communication scholars have been more concerned with creating models than theories. Yet, the use of the term model has also varied greatly. Lacy and Niebauer (1995) argue that a *model* varies from theory in that a model aims to explain how something happens, with little or no effort put into explaining why, but it, like theory, can define theoretical terms and state specific relations. Shoemaker *et al*. (2004) distinguish between physical models and conceptual models, where a *concept* is the building block of theory, an abstraction or generalized idea, which describes a portion of reality (ibid.).

When new observations are made, theories are challenged (Curtis and Barnes, 1994), which can be the beginning of a paradigm-shift within the scientific discipline (Kuhn, 1996).

2.1.1. Different approaches of scientific theory

Very simplified, ideas about what constitutes science can be explained from two opposite ends of a continuum, at least as regards the scope and scientific discipline of the present work. On one end is the school of ideas, theories and models, i.e., *theory-then-research-strategy* (deduction), originating from the philosophical ideas of *positivism* – the physical-natural and reliable-exact. On the other end is the school of observations and experience,

[2] Mass communication research or mass media studies deal with media effects, media structure and media content and commonly take place within the discipline of social science (Weibull, 1994).

i.e., *research-then-theory-strategy* (induction), originating from philosophical ideas of *hermeneutics* – human-social and recognizable-interpretive. The choice of research approach largely concerns the researcher's opinion about the relation between theory and empiricism (Wallén, 1996). In *deductive* research, the results should be related to the already existing theory (Patel and Davidson, 1994; Frankfort-Nachmias and Nachmias, 1996; Wallén, 1996; Hartman, 1997:138), thus it is not possible to observe generally and hope to observe regularity; a proposition must be stated from the start (Hartman, 1997:138). *Induction* constitutes the inverse situation; it is a way of exploring, and is based on the idea that all knowledge starts as a series of individual experiences, and from observations of these experiences (discovered systematic patterns), generalizations can be made (Andersen and Gumdrup, 1994b:34; Frankfort-Nachmias and Nachmias, 1996). Inductive research should not be based on a preconceived view or theory, but should formulate a theory based on the empirical material. To get around the problem of everything having to be derived from observations, inductive theory has introduced the idea of probability (Knudsen, 1994:116). Criticism towards deduction is that it cannot provide knowledge that is completely new and induction knowledge that is absolutely certain (Patel and Davidson, 1994; Wallén, 1996). *Abduction* is an additional concept introduced to provide 'intuitive' and 'creative' knowledge (Knudsen, 1994) through reasoning, starting from a set of accepted facts, which are gathered to form the most likely, or best, explanations. Abduction cannot be used schematically, but requires thorough knowledge of the discipline in which the research is carried out as well as experience of similar research (Wallén, 1996). Thus, deduction proves that something must be; induction shows that something actually is; abduction merely suggests that something may be (Peirce, 1903). Or put another way: Abduction plays the role of generating new ideas or hypothese; deduction functions as evaluating the hypotheses; and induction is justifying the hypotheses with empirical data (Staat, 1993). Each concept can be divided further, for example induction into *analytical induction* (a relatively linear process) or *iterative induction* (data collection and analysis are performed iteratively) (Hartman, 1997:241ff). Nevertheless, the dividing line between these different scientific procedures is rather indistinct (Hartman, 1997: 94). Most often, different combinations serve the purpose of inquiry, for example design research methodology can include both abductive and deductive logical formalism (Takeda *et al*., 1990, in Vaishnavi and Kuechler, 2007:18§). Additionally, philosophical ideals of positivism and hermeneutics can be sub-divided further, for example positivism into *logical positivism* and *post-positivism* (e.g., Andersen and Gamdrup, 1994b; Bjereld *et al*., 1999), and 'in between' these ideals, there are many other philosophical assumptions and paradigms, for example *critical realism* (the world exists independently of us, hence it is not fully graspable), *constructivism* (knowledge is not 'passive' but is 'constructed' by the researcher), and *pragmatism* (knowledge is undertaken by the use of it) (Wallén, 1996). Many researchers are not aware of which specific ideal their discipline strives for, though it can be seen in the scientific standpoints, for example the aim of the research, the scientific approach, and the methodology used (Patel and Davidson, 1994).

2.1.2. Generalization

All science aims at understanding how the world is connected, to relate theory and reality to each other (Patel and Davidson, 1994), and to be able to raise the results obtained by the

researcher above the level of the specific case (Bjereld *et al*., 1999). This is dependent on the possibility to generalize. There are at least three forms of generalization, depending on the pre-conditions of the research. In *theoretical or scientific* generalization, a theory is used to predict an empirical result by pointing out certain criteria that must be fulfilled – X always produces Y. In *empirical or statistical* generalization, an empirical generalization can predict an empirical result using probability calculations – Y is produced in x% of the cases. In research containing elements of uncertainty, where X may produce Y, called *fuzzy* generalization by Bassey (1999; 2001, in Hammersley, 2001:219), the ability to generalize has been argued. The opponents argue that if the conditions for theoretical or statistical generalization are not fulfilled, generalizations cannot be made. The advocates argue that the specific phenomenon's mode of formulation and case, determine whether it applies to other cases (Yin, 1994; Bassey, 1999; 2001, in Hammersley, 2001:220; Gummesson, 2004).

2.1.3. Qualitative or quantitative

Methodology refers to a tool needed to achieve the objectives of research (Holme and Solvang, 1997), a tool that provides the researcher with the basis for a systematic framework, i.e., the choice of method(s) suitable for him/her to use (Hartman, 1998). Methodology can be divided into quantitative and qualitative methods (ibid.). *Quantitative* research usually emphasizes quantification in the collection and analysis of data and tests theories (Taylor and Trumbull, 2000). As a research strategy, it is deductive and objectivist (Bryman, 2001), originally developed in the natural sciences to study natural phenomena (Myers and Avison, 2002), in particular influenced by positivism (Andersen and Gamdrup, 1994a:70), but quantitative researchers do not always subscribe to these features. *Qualitative* research, on the other hand, develops theories (Taylor and Trumbull, 2000), usually with an emphasis on words, rather than quantification in the collection and analysis of data. As a research strategy it is inductive, constructive and interpretative (Bryman, 2001), originally developed in the social sciences to enable researchers to study social and cultural phenomena (Myers and Avison, 2002). Much of the qualitative methodology is based on hermeneutics (Hartman, 1997), but the qualitative researcher does not always subscribe to these features. Thus, qualitative is not synonymous with interpretive, but depends on the underlying philosophical assumption of the researcher. It follows from this that the choice of a specific qualitative method is independent of the underlying philosophical position adopted. For example, case study design method can be positivist (Yin, 1994), interpretive (Walsham, 1993, in Myers and Avison, 2002:6) or critical (Myers and Avison, 2002).

An investigation is not limited to a single method. Many times the use of several methods strengthens an investigation. This is called *triangulation*, which can be subdivided into specific types (Denzin, 1984, in Stake, 1995:112f; Patton, 1987, in Yin, 1994:92): (1) *data triangulation* – when the researcher looks for the data to remain the same in different contexts, (2) *investigative triangulation* – when several investigators examine the same phenomenon, (3) *theory triangulation* – when investigators with different viewpoints interpret the same results, (4) *methodological triangulation* – when one approach is followed by another, to increase confidence in the interpretation.

2.1.4. Data analysis

The techniques used to analyse data will depend on the research's quantitative or qualitative properties, as well as the personal and educational background, and the methodological preferences of the researcher (Dawson, 2002). Quantitative research endeavours to show that its chosen method actually measures what it is supposed to measure; stable, consistent, free from error and bias (ibid.), statistical methods are commonly used to analyse quantitative data. Descriptive statistics (inductive statistics) enables the researcher to summarize and organize data, providing a numerical description of the research data. Inferential statistics (deductive statistics) refers to methods of making decisions or predictions about a population[3], based on data obtained from a sample of that population (Patel and Davidson, 1994; Frankfort-Nachmias and Nachmias, 1996; Francisco, 2000). Qualitative research on the other hand, largely lacks well-formulated, explicit, systematic analysis methods (e.g., Miles and Huberman, 1984). There exist guidelines and procedural suggestions (Patton, 1990), but much of the analysis of qualitative data depends on the skills, training, and capabilities of the researcher (Lee and Fielding, 2004). Qualitative research is in some sense more difficult, because the data and analysis are much more influenced by the researcher's personal and methodological standpoints; the human factor is a great strength and the fundamental weakness. Most qualitative analysis seeks a systematic consideration of usually text-based data in order to identify themes and concepts, which are identified and coded in one data source and compared and contrasted with similar materials in other sources (Hartman, 1997; Gummesson, 2004; Lee and Fielding, 2004). Because qualitative data are concerned with words rather than numbers, collected in a variety of ways, the data generated are often voluminous (Miles and Huberman, 1984; Patton, 1990; Lee and Fielding, 2004). Quantitative data are commonly analysed after they have been collected, whereas qualitative data can be analysed during the research process, refining and reorganizing the process based on the emerging results (Dawson, 2002). In qualitative research it is perhaps more accurate speak of "modes of analysis" rather than "data analysis" (Myers and Avison, 2002).

2.1.5. Preference of method

Depending on how much is known about the fundamental problem addressed in the research before the investigation starts, and what types of questions the research is supposed to answer, research methods are classified differently (cf. Patel and Davidson, 1994; Andersen and Gamdrup, 1994b). When there are gaps in the knowledge regarding a certain topic, the research will be *exploratory*. The aim of an exploratory study is to gain fundamental, and as much, knowledge as possible within a certain problem area, hence the aim is to elucidate the problem area comprehensively. Explorative studies are often used to collect knowledge for further research, and commonly several methods are used to collect the information (Patel and Davisdon, 1994; Wallén, 1996). If there is already some existing knowledge about the topic, the investigation most commonly will be *descriptive*.

[3] A group of interbreeding organisms of the same spices, living in the same place and the same time (Curtis and Barnes, 1994).

A descriptive investigation can describe historical, contemporary or future circumstances. The aim is to restrict the investigation to a few aspects of the phenomenon of interest, and to describe these aspects individually or the relation between these aspects. Usually one method is used to collect data about the topic, which might be further investigated through other methods (Andersen and Gamdrup, 1994b; Patel and Davisdon, 1994). *Explanatory* and *predictive* investigations are conducted on a deeper level than descriptive investigations. Both explanatory and predictive investigations use theories or models together with descriptive facts to derive statements about concrete phenomena based on these theories. The difference between the explanatory and predictive studies lies in the fact that an explanation includes an occurrence that has already happened, whereas a prediction includes a future, not-yet-occurred event. There are several ways of giving explanations based on various science theories (Andersen and Gamdrup, 1994b).

2.2. Applied methodology

Below is a summary of the methodology applied in the present work. For specific presentation of the set-ups, configurations and material of the studies, see the respective publication, Papers I-VII.

2.2.1. Papers I and II

Based on the same study, Papers I and II are descriptive and aimed at examining and describing the colour reproductive performance of high-quality displays, answering questions of a *how* and *how much* character. As the study conditions could be manipulated directly, systematically, and precisely, the experimental methodology consisted of instrumental measurement of displays, under controlled ambient conditions. The experiment was deductive, as the aim was not to observe in general. The experiment was partly based on a descriptive experimental design, when each individual display was tested, and partly on a comparative experimental design (comparison of two materials), when the displays' performances were compared to each other. The displays, one CRT and four thin film transistor (TFT) LCDs, were chosen as theoretical samples on the condition of being highly suitable for the colour-critical work of the manufacturers. Few displays met that requirement when the study was performed. The study distinguishes itself from similar experiments previously performed (e.g., Fairchild and Wyble, 1998; Gibson and Fairchild, 2000; Kwak and MacDonald, 2001; Marcu *et al.*, 2002; Yoshida and Yamamoto, 2000; 2002a, b) by specifically selecting high-quality displays intended for colour-critical work, and by focusing the outcome of the study on applications requiring high-quality colour reproduction. The measurement data were analysed using univariate analysis, calculated using C++ and Microsoft Excel. All the measurements were performed during the summer of 2003.

Reliability and validity

The reliability of the displays was assured by choosing high-quality displays, calibrated before the measurements started, and by using a controlled experimental environment,

where ambient light and reflection were eliminated. A test-retest[4] was performed for the displays. The correlation coefficient (r) was 0.69 and 0.75 for the *Apple20* and *Eizo,* respectively, and 0.73 for the *Barco* display, these correlations were deemed adequate. The measurement device (the spectroradiometer) could not be calibrated, but was rented from a distributor that had a good reputation and that stated that the device was well calibrated. The measured values were compared to equivalent measurements made by the researcher twice before and were deemed adequate. The reliability should also have been improved by the use of established methodology.

The internal validity should have been increased by the use of established methodology, a controlled (reliable) set-up, and the researcher had performed similar measurements before. The external validity of this study is established if the displays used had characteristics similar to the population, which here constitutes displays in general. Because the study aimed at describing a certain type of display (high-end displays adequate for colour-critical work), the resulting data may be superior to data from a 'general' display. However, because the empirical data do not diverge greatly from the data obtained in the theoretical framework of Papers I and II, the results should be applicable to LCD technology in general. A limitation to the external validity is the dependence on time and technology. Display technology is continuously developing, and different technology yields different results, thus using other brands or later developed technology will yield different results. But this should also be validated by the similarity to previous results in the theoretical framework of Papers I and II, which strengthen the construct validity.

Both reliability and validity should be increased by the fact that the data have been collected from several displays of the same brand, as a control group, though these results are not all presented in Papers I and II.

2.2.2. Paper III - IV

Paper III-IV aimed at answering questions of a *how* and *what* character. The study aimed at exploring an intervention with regard to which research and theory are in an early formative stage: e-paper technology used in newspaper publishing; at describing a contemporary process: newspaper production and publishing within its real-life context of which the researcher has no regular control; and at explaining how to implement an e-paper product into the existing production process. Based on these preconditions, case study methodology was regarded as appropriate. This study may be seen as a mix of an iterative inductive and abductive process, since the intervention studied (e-paper) does not yet exist as a newspaper product, and to the author's knowledge, no similar study has previously been performed. Thus, a process applied to generate a new idea, created and justified through empirical data.

[4] A *test-retest* uses the same measurement instrument/same group of people at two different times, and computes the correlation between the two sets of scores/observations, which gives a reliability estimate.

Table 2.1 The newspaper companies participating in the case studies providing the data for Paper III-IV.

Name	Country	Circulation
De Telegraaf	The Netherlands	808 300*
Göteborgs Posten	Sweden	245 900**
Los Angeles Times	USA	907 997***
Rhein Zeitung (online)	Germany	250 000****
Sundsvalls Tidning	Sweden	35 300*****
Sydsvenska Dagbladet	Sweden	187 100**
Östgöta Correspondenten	Sweden	60 300**

*(Sovereign Publications, 2006)
***2006, Weekdays* (TU, 2006a)
****Daily circulation* (Los Angeles Times, 2006)
*****(Benfield, 2006:16§)
******(TU, 2006b)

The multiple embedded cases consisted of the newspaper companies shown in Table 2.1, selected through theoretical heterogeneous samples with regard to the companies' explicit interest in new ways of delivering and displaying news content, in particular by (the potential) e-paper. All companies are well-established mid-sized or large companies in their respective countries.

Table 2.2 Logical analysis matrix, providing the fundamentals of the interview questions.

CONTENT	CHANNEL	SYSTEM	TERMINAL	
Personalisation Interactivity Size, space, colour Standards Content source format	Packaging (format) Personalisation More than one channel Standards	Infrastructure Open system Standards	Personalisation Platform (format, update,access)	AGGREGATION
Sections,subsections Advertisment Notification Bookmarks			Content extraction for accessibility Navigation	FILTERING (ads, personalisation)
Presentation Content Format Layout		Editorial environmental tools Content source format Colour management	Static or active Personalisation Presentation	MAKE-READY (layout)
Content format Presonalisation	Format Packaging Carrier 1-way, 2-way communication Security Reliability	Access (database) Update Interface Client platform Security Standards	Format Power consumption Avaliability Client platform Functionality Interface Colour management	DISTRIBUTION
User profile	User profile (personalisation) Revenue/cost between actors Complaints	Billing (issue or subscription) Rev/cost between actors		SALES BUSINESS

The evidence (data gathering) came from three main sources, listed in a case study protocol: documents, interviews and direct observations. The documents were mainly former studies of the same sites as those under study (Leckner and Nordqvist 2002; 2003), related research articles, and technical documents. A number of interviews were carried

out at each case with the managers of Development and Strategic Planning (or similar function), IT strategies, IT technology, Advertisement, Sales, Image processing, and Distribution. The interviews were in-depth, and consisted of semi-structured and focused interviews. The questions in the semi-structured interviews were based on the logical analysis matrix (site-ordered predictor-outcome) shown in Table 2.2.

The interview data were corroborated by direct overt observations at the international companies, and by additional semi-structured and unstructured interviews with informants, shown in Table 2.3. In addition, a workshop was conducted including approximately 20 participants from several national and international newspaper companies, interested parties and researchers. The workshop consisted of a brief presentation of the results from the case studies, with the main emphasis on group exercises concerning modelling of production workflows for various publishing scenarios for e-papers, and the difficulties related to the implementation of an e-paper product into existing newspaper production workflows.

Table 2.3 The additional companies interviewed in the case studies of Paper III - IV.

Name	Country	Product
Alfa	The Netherlands	Software system developer*
Anygraaf	Sweden	Software system developer*
Elib	Sweden	E-book distributor
Escenic	Norway	Software system developer*
Palo Alto Research Centre (PARC)	USA	Research
Satellite Newspapers	Germany	Software system developer*/distributor
Scoop	Sweden	Software system developer*
Tietoenator	Sweden	Software system developer*

*Solutions for distribution and handling of digital newspapers.

No single or specific data analysis method was used. The text-based data, mainly from the interviews, were categorized through open coding[5], and then grouped further through a form of pattern coding[6]. The analysed data were then used to construct theoretical models of workflows of e-paper news production. All the case study data were collected during the autumn of 2004.

Reliability and validity

The internal and external validity and the reliability of the results are dependent on the cases under study, the research task, and the researcher. The reliability, defined as the possibility to repeat the studies and achieve a similar result, is therefore reduced over time. Reliability is generally difficult to achieve in the kind of study presented here, as the behaviour of companies and equipment change over time, with overall change in the market, and in technological and societal development. However, to increase reliability, case study protocols were used and developed for each case studied, including interview guides, and the data were systematically collected, documented and stored. Inter-subjective

[5] Index system classifying data into categories by highlighting, cutting, pasting, and resorting the documents or transcripts of the notes collected (Pidgron and Henwood, 2004).
[6] A method to inductively reduce coded pattern (Miles and Hubermann, 1984).

reliability was achieved by agreement between the two researchers studying the cases, and by the use of a tape recorder and one researcher taking notes in all the interviews.

The internal validity should be increased by (1) data (embedded multiple cases), methodological (interviews, observations, and workshop) and investigative (two researchers) triangulation to corroborate the data, (2) the number of cases that are literal replications, and (3) specification of the units of analysis. (1) should also increase the construct validity. To increase generalizability, i.e., the external validity, multiple case study design, including more than one type of media company and different sized companies in the cases, was used, as well as triangulation. However, as mentioned, the results have limitations in that the data obtained are dependant on changes over time, as technology and workflows develop.

2.2.3. Papers V and VI

Based on one study, Papers V and VI can be considered as descriptive, as they aim at describing consumers' reading behaviour of newspapers on various output media, by answering questions of a *how* and *what* character, through an iterative inductive process. To successfully address such an aim, the research requires controlled methodological conditions, such as experiments, and a variety of set-ups: stimuli, subjects, and reading devices. Hence, to obtain an extensive amount of data at reasonable expenses in terms of time and money, no primary investigation was carried out. Instead, a combination of review and secondary analysis was performed, where the data were collected in a rather narrow area of research, therefore with limited data available for analysis.

The analysed materials were selected on the basis of 'all that could be found', i.e., a theoretical population, collected during the time period of a year. Most of the materials analysed in this study were published articles focusing on the behaviour of reading newspapers. These articles primarily included work using explorative and experimental eye tracking methodology; quantitative data analysed through univariate analysis and hypothesis testing, and qualitative data by means of observation analysis, and from interviews of the subjects, performed before or after the experiments. In this study, the (qualitative) secondary data were analysed through a mix of review and secondary analysis methodology, in part using a perspective different from the original question, with a grounded theory[7] approach. It is difficult, in a secondary analysis, to define exactly where the primary analysis stops and the secondary analysis begins, as it is an iterative process. However, carefully referencing has been employed to separate primary from secondary data.

Most of the primary data were produced within the past ten years from now (2007). The number of such studies is rather small, nevertheless further data could exist that have not been found and that are, thus, not used in the present study. The secondary analysis was performed in 2005-2006.

[7] An inductive method in which data collection and analysis occur continuously, until data collection and coding become saturated, then forming a more formal theory (Glaser and Strauss, 1967; Pidgron and Henwood, 2004).

Reliability and validity

The present data include several limitations. The reliability is difficult to verify, as the study is based on research conducted by others, meaning that differences in set-up and evaluation properties that affect performance and results are not always clearly specified, and thus could not be controlled.

Several of the experiments used in the initial works were performed using a quasi- or pre-experimental design, i.e., the studied factors have not been systematically varied and controlled. Furthermore, eye-tracking studies are performed under artificial conditions, with a possibly impeding apparatus, which might affect the typical behaviour of subjects. Reading behaviour is also greatly dependent on the format, presentation-style and content of the stimuli. Time and individual behavioural differences are also important factors. To increase the reliability of the present study, only studies offering descriptions of their conditional parameters were evaluated, briefly presented in Appendix A in Paper VI, and all included studies are openly available through library or journal services.

For the same reasons, external validity is difficult to ensure. To increase the possibility of generalization, an extensive number of works has been analysed (i.e., primary data triangulation and secondary investigative and data triangulation), including more than one type of research methodology (i.e., secondary methodological triangulation). Internal validity is also difficult to ensure, but should be increased by the amount of material that yields literal replications, and the specification of the units of analysis.

2.2.4. Paper VII

This study is connected to Papers V and VI, but aimed at collecting primary empirical data, and hence can be considered descriptive and explanatory, a deductive approach. The experimental design (descriptive and comparative) was chosen because the aim was to determine *what*, *how* and *how much* the subjects actually use a newspaper depending on media, thus eye-tracking methodology seemed most appropriate. In addition, the experiment was complemented by a questionnaire, as *why* the subjects used the stimuli as they did was also of interest.

The **experiment** consisted of three parts, where each part involved reading a newspaper from one of the media: print, online, e-paper, and answering a questionnaire related to newspaper reading and the media used. The maximum time for reading each newspaper was 15 minutes, but the subjects were allowed to quit earlier if they wished, as they were instructed to read as they normally do, and were allowed to move as much as the equipment permitted. The subjects were also instructed not to read the print newspaper the day prior to the experiment, and the online newspaper on the day of the experiment. All subjects read all the newspaper editions/media. The experiment began and ended by the respondents filling in a part of the questionnaire, altogether the questionnaire consisted of five parts, 38 questions in total, answered by each subject.

Subjects were mainly major students from a technical university in Sweden, and three where research employees at the same university; a total of 12 subjects participated. Ten

were between 20-35 years and two between 35-60 years; there were seven males and five females. One subject was used as a pilot, and one could not be calibrated precisely, thus the eye-tracking results include recorded data from ten subjects, six males and four females, of which nine out of ten were younger than 34. The questionnaire results include data from all 12 subjects. One criterion for participation was good computer knowledge and frequent internet use. With regard to adoption of innovations, nine of the subjects considered themselves as early majority, the rest as early adopters, late majority, and one laggard. Each subject received a movie ticket for his/her participation.

The **stimuli** consisted of editions of the newspaper *Dagens Nyheter*, a Swedish national daily morning newspaper. The three media stimuli used were a traditional edition printed on paper in tabloid format, an online edition shown on a stationary 20-inch *Dell* TFTLCD computer screen (1280x1024 pixels, 32 million colours), and an e-paper edition shown on a 8.1-inch *iRex* e-paper device (160 ppi, 16 grey levels). The e-paper edition was a newspaper prototype made in *Adobe InDesign*, consisting of 70 pages, and seven sections, based on content from the online edition, content published a month previous to the experiment, and designed as a mix of the layouts from the online and print editions of *Dagens Nyheter*.

Data from the online and print reading sessions were **recorded** using a *Tobii x50* eye-tracking system and *Clear View 2.7.1* analysis software. Tobii is a stationary tracker that uses binocular eye tracking, a frame rate of 50 Hz, and the average accuracy at gaze point 50 cm from screen is 0.5 degree. The field view of the camera is about 20x15x20 cm at 60 cm from the screen at which the subjects were positioned, and the eye tracker allows for +/- 40 degrees in semi-circle above the camera and gaze angles up to +/- 10 degrees below the camera. The online data were recorded directly by the software system, and the print stimulus by a scene camera. The e-paper data were recorded by *ViewPont Eye Tracker PC-60* and *ViewPoint* X software. The tracker is head-mounted, using infrared light and a camera to record data. The tracker was used in black pupil mode, in high precision mode (30 Hz, and 640x480 pixel resolution).

Analysis of the online and print recordings was carried out by quantitatively defining areas of interests (AOIs), and qualitative evaluations were made of the data from the e-paper recordings through observations of the films. The experiment was performed in April 2007.

Reliability and validity

The limitations of this study are several. Because no control group was used and the aim was to compare different stimuli – thus the stimuli could not be systematically varied – the experiment must be regarded as quasi-experimental. However, the preceding extensive literature study of similar experiments, presented in Papers V and VI, increases the likelihood of inter-subjective reliability, content validity, and generalizability. The recorded behaviour is also greatly dependent on format, presentation-style and content of the stimuli. To increase the reliability, only one large newspaper brand was used. The study was also piloted, and each subject set-up was carried out by the same person, which should increase the reliability and internal validity. Furthermore, the study aimed at examining natural behaviour under artificial conditions, thus the impeding apparatus

affected the typical behaviour of the subjects. With the online stimulus, 50% said the apparatus affected their reading, mainly by causing a more static position than usual. With the print stimulus, 60% said the apparatus impeded their reading, mainly because the newspaper was placed on a rack, thus the position become somewhat uncomfortable. However, more than 50% said they read as they usually do, the main difference being reading for longer or shorter times than usual.

With questionnaires, it is difficult to control the reliability and validity beforehand, but the questionnaire was piloted on three persons before they were used in the study. As the questionnaires were intended to support the experimental data and not to make a probability sample, the data were considered to have qualitative value, although no statistical generalizations could be made based on them.

2.2.5. The thesis work

The present work is based on a wide content spectrum as opposed to a narrow, deep equivalent; this is both the strength and weakness of this work. It is a strength in that it is probably a unique subject of research, it has provided the author with knowledge in a wide area of media technology, and made it possible to learn about several methodological approaches. In that sense it is also a weakness, as it has not been possible to concentrate on a specific subject, go deeper into one theoretical and methodological area. Moreover, while having a multidisciplinary approach, thus, bordering on several areas not possible to fully cover, there is always a risk of stating the obvious, and/or making naïve comments. To avoid this to the greatest extent, an extensive amount of reference literature has been read. The same approach has been used to solve the difficulty of statistics of media consumption, which diverge depending on source, way of measurement and country. Something also noticed by for example Picard and Brody (1997:26), De Bens and Østbye (1998:7), and Weibull (2005:28).

Many of the conclusions drawn here are predictions. For example, Bolter (1996:254) argues that it is "unwise to try to predict technological change more than a few years in advance. We cannot know whether readers in the year 2000, 2010, or 2050 may come to prefer computers to [print]. We do not know what computers will look like…we do not know how small they will be, how portable, how comfortable and convenient to read. It is even more difficult to make predictions about the social or cultural impact of technological change." It is very hard to make predictions that turn out to be correct, even when you are sure. Prediction of which technology will survive and which will not depends on knowing in advance how many factors will change. However, while, according Levitt (1965:93), predictions are always hazardous to make and seldom very accurate, making them is undoubtedly far better than not trying to predict at all (see also e.g., Nunberg, 1996; Dimmick, 2003). Aware of these problems, the predictions made here have been put forward, to the greatest extent possible, in a theoretically and empirically systematic way, much by showing a matter's positive and negative aspects, since the discussion of pros and cons, according to e.g., Stöber (2004), make the character of new media clearer for society. Moreover, the present work is not indented to provide a specific guideline of actions on how the newspaper industry should succeed with their digital ventures, but to provide a generalized analysis of the impact of digital media on the newspaper industry.

CHAPTER 3

THEORETICAL FRAMEWORK

3.1. Definitions

3.1.1. Media

The definition *media* is not straightforward. Depending on context, agenda, and on a person's technological, economic, psychological, social or cultural interests, or a mix thereof, the word media has several meanings: hardware, software, applications, features and services, industry structures and ownership, behaviour and perception, or content and its form (e.g., Lievrouw and Livingstone, 2002).

Thus, the word media has many constructs: it can represent an *action* (to mediate), an *end product* (a [mass] medium), a *technology* (output platform), and/or the *organization* producing it (the industry), all summarized into a single *concept* (mass media). Consider, for example, the *newspaper* (the concept): a newspaper (an end product) is printed (an action) on newsprint (a technology) by a newspaper company (an organization).

3.1.2. "New media"

The definition *new media* is, in comparison to *media*, even more ambiguous. In the latter part of the 20th century, a number of media appeared that were called new. However, today's new media do not constitute a new phenomenon, but this phenomenon occurs every time in history when a medium that has not previously existed in that form appears (cf. Marvin, 1988, in McMillan, 2002:164). How long new media remain 'new' is also rather vague. Thus, a popular subject among media theorists (e.g., Fidler, 1997; Bolter and Grusin, 2001; Manovich, 2001; McMillan, 2002) concerns how often so-called new media are completely new; this is discussed further in Section 3.2.3. In McMillan (2002), several authors define the differences between 'old' and 'new' media: Williams *et al*. (1994) define new media as applications of microelectronics, computers and telecommunications that offer new services or enhancement of old ones. Negroponte (1995) suggests that one of the things differentiating new media from old is that new media are based on the transmission of digital bits rather than physical atoms. Pavlik (1998) indicates that, for the media consumer, the major difference between old media and new is greater user choice and control. And already in 1972, Chaffe suggested that most new communication technologies, with the exception of the telephone, have advanced the art of mass communication, whereas the latest batch of new technologies seemed to be shifting the balance towards interpersonal communication.

Today, there is a range of expressions for new media – digital media, interactive media, multimedia, information and communication technologies (van Dijk, 2004), electronic

media, networked computing, telecommunications – or indications of particular new media, for example, various computer devices, internet and WWW, weblogs[1], podcasting[2], and streaming[3]. The newness of the above examples is on a sliding scale, but simplified for the purpose of the present work, new media could be defined as being *digital*, as opposed to old or older media, which here mainly refers to analogue media and their implications, for example *traditional mass media*: print newspapers, analogue television and radio, paper books etc.

The digital environment – electronically augmented or immersive space[4] – is unique, because the information can be relatively easily personalized to every user, can change dramatically over time, and can be delivered through an interactive multimedia interface (Manovich, 2006: 225). Delivery is distinguished by two categories: *online* and *offline* media. Offline media are, for example, portable discs of various kinds. Online delivery requires a telecommunication network, usually based on a backbone-infrastructure and different access technologies (Rawolle and Hess, 2000:89). There is also a distinction between *static* (time-invariant) and *dynamic* (time-variant) media types. Typical examples of static media are text, graphics and pictures, whereas video and audio belong to the category of dynamic media types. Not all devices support all types of media, and dynamic media typically require more bandwidth as well as devices of higher quality and capability, depending on the technical quality of the content (ibid.:91f).

For digital content, the producer must decide which media format or formats best convey a certain story (*multimediality*), consider options to customize certain stories for specific users (*personalization* or *customization*), and decide how to connect the story to other stories, archives, resources, and so forth, through hyperlinks (*hypertextuality*) (Deuze, 2003:206). Moreover, the producer must consider options for user response (*interactivity*). *Interactivity* is an important aspect of today's digital media discourse, though the term or concept per se is not exclusively related to digital media, as earlier media and types of mediated communication have claimed to be more or less interactive (ibid.). Interactivity on, for example, the internet can be seen from various perspectives, subdivided into three types: *navigational interactivity* (how the user is allowed to navigate within a website), *functional interactivity* (the user can participate in the production process by interacting with other users or the producers), and *adaptive interactivity* (every action of the user has consequences for the content of the site) (King, 1998:26, in Chan and Leung, 2005:362; Deuze, 2003:214).

---

[1] A frequent, chronological publication of personal thoughts, links, news published on the WWW (e.g. Herring *et al*., 2004; Matheson, 2004)

[2] Publishing and delivery of audio (radio-like), or video content, downloaded to a media player, on demand and by subscription (Chan and Lee, 2005; Fischer, 2005).

[3] Real-time transmission of stored video, where content need not be downloaded in full, but is being played out while parts of the content are being received and decoded (Dapeng *et al*., 2001).

[4] Weather a digital environment is regarded as augmented or immersive on a particular situation may simple be a matter of scale, e.g., depends on the relative size of the display. A bigger screen make the user more immersed to the virtual reality, whereas with a smaller screen the user is still largely present in physical space; it does not take over but adds to the phenomenological experience (Manovich, 2006:225). A paradigm that is moving past the desktop computer paradigm.

3.1.3. Newspaper

News could be described as events that are new, timely, and relevant, and its functions to inform, educate, guide, and entertain the reader (Turpeinen, 2000:22). News products are provided by mass media organizations such as newspaper, radio and television organizations. Traditional mass media news products are characterized by providing information and entertainment to a large and public group of people, who are almost simultaneously reached by the content (Hadenius and Weibull, 1999; Stöber, 2004). Traditional news products are also characterized by being *one-way*; no feedback or return connection to the sender is generally possible (Hadenius and Weibull, 1999). On the other hand, news products published on digital media are characterized by, or provide the opportunity for, customized, dynamic, and *two-way* communication. Independent of media, however, timeliness is an essential ingredient of novelty and relevance, both of which are highly prised in news (Turpeinen, 2000:30).

What constitutes a newspaper?

A *newspaper* is a product containing news, information, entertainment and advertising, most of which is of general interest rather than niche content, most often published daily or weekly. However, an exact definition of a newspaper still remains unclear, because there is no single industry agreement on the aspects that constitute a newspaper. A commonly agreed-on definition for legal purposes describes a newspaper as a *publication, usually in sheet form, in which a substantial portion of the content is devoted to intelligence concerning current events and news of general interest, and intended for general circulation and published regularly at short intervals, commonly weekly or more often* (USC, 1970; SFS, 1990:524; SFS, 1993:1392). Newspapers-like publications of popular or special interest, and publications published less often than on weekly basis, are considered magazines or journals (KB, 2006).

Consequently, there are wide differences in the dispersion, frequency, content and format of publications that call themselves newspapers, and these factors differ across countries. *Area of distribution* includes international and national daily newspapers, metropolitan and regional daily newspapers, and local daily newspapers[5]. Regarding *frequency of distribution*, many countries follow the definition provided by Unesco, where a *daily* newspaper is one that is published regularly at least four days a week (UNESCO, 2004). The definition can also vary within a country. In Sweden, the definition of a *daily* newspaper is a newspaper published at least once a week (SFS, 1990:524:6§; KB, 2006; TS, 2007). Frequency can be divided into *low frequency newspapers* (published once or twice a week), *medium frequency newspapers* (published three to five times a week), and *high frequency newspapers* (published six to seven times a week) (SFS, 1990:524:6§). Newspapers can also be divided according to their (traditional) content and publishing schedules. *Morning* newspapers are commonly associated with serious, qualitative journalism, whereas the *tabloid* press, also called *evening* newspapers, has been devoted to more sensational and scandalizing journalism (e.g., Hadenius and Weibull, 1999; Khattak, 2005) designed for easy readability, including larger images and shorter texts. The term

[5] A national newspaper circulates throughout the whole country, whereas a regional and local newspaper serves a region or a community/city.

tabloid refers to the format these newspapers traditionally have been printed on, but has come to reflect the type of content these newspapers include, although today, tabloid format and sensational content do not necessarily coincide. A *free* newspaper is a relatively new concept; it contains brief summaries of daily news (news bulletins and short articles), is designed as to be easy to read, and intended for less than twenty minutes of reading (Wadbring, 2003; Metro, 2007). It is also commonly distributed on weekdays and is free of charge (Wadbring, 2003) since it is financed through advertising. Free newspapers are of increasing importance, for example, the free newspaper *Metro* is the largest and fastest growing printed newspaper in the world (Metro, 2007). The traditional definition of a daily newspaper, at least in Sweden, commonly includes morning and evening newspapers (e.g., TU, 2006; NORDICOM, 2007.1; TS, 2007), but not free newspapers and online newspapers (described below). The main reason is that free and online newspapers are new channels and it is still uncertain how these channels should be defined, and/or they do not, for example, include information about circulation and demographics of the audience-reach, and have a price that is general for other newspapers in the same category (cf. e.g., Wadbring, 2003; Sifomedia, 2007), in Sweden required in order to achieve subsidy (SFS, 1990:524). However, for example the *Newspaper Research Program* (Dagspresskollegiet), an important actor in the area of statistics on the Swedish newspaper market, includes free newspapers in their definition of a daily newspaper (Weibull, 2006), and the *Swedish Newspaper Publishers' Association* (TU) has no specific definition, but uses Swedish and international definitions based on the source of the statistics (Lindberg, 2006).

Most commonly, a newspaper is printed on newsprint at a web-fed cold offset printing press, and newspapers are primarily found in three formats: *broadsheet*, *tabloid* and *Berliner* (NORDICOM, 2004:104; Garcia, 2005; Khattak, 2005). A fourth format, the *micro* format, is starting to gain interest (e.g., Garcia, 2005; Khattak, 2005). Broadsheet[6] is the traditionally format of newspapers, especially morning newspapers. The tabloid format is typically half the size of broadsheet and traditionally used by the tabloid press. Berliner[7] is a format used by several European newspapers (Garcia, 2005), and the micro format is half the size of the Berliner (Khattak, 2005).

Development of the newspaper concept

The general, traditional meaning of a newspaper medium is a newspaper printed with ink on newsprint. However, electronic publishing is becoming increasingly important. *Electronic publishing* means publishing of material in electronic form, requiring an electronic device, an application, and some form of connection (one or two-way) (Peurell *et al*., 1994). In the present work, publishing includes: the *output platform*, the *application*, the packaged content (*edition/news product*), the production and the *delivery*. Electronic publishing can consist of analogue output, but is commonly digital (ibid.). With regard to electronic publishing of newspapers, this is essentially true, thus electronic and digital are used analogously here.

Output platforms in electronic publishing include many forms of media technology, for example, compact and digital versatile discs (CDs and DVDs), radio and TV devices, phone

[6] Approximately 600x380 mm.
[7] Approximately 470x315 mm.

devices, and computer devices, which can be both stationary and portable/mobile. Significant output devices in electronic publishing of newspapers are high-end interactive computer devices with larger displays and two-way communication, discussed further in Section 3.1.4.

An *application* is a software program used for specific purposes, for example weblogging, podcasting, and streaming digital content, but can also include services such as encyclopaedias or viewing of special versions of a newspaper, where *software* refers to computer programs that can be used for general purposes within a field, for example, showing a newspaper company's website. In electronic publishing of newspapers, an application could be included in the news product as plug-ins delivered to a device (output platform), or could already be included in the device as software.

An *edition* is the packaged content, an issue of a *news product* (here, a *newspaper*, in comparison to other mass media products such as the ones produced on radio and television). An edition can include general *content* (articles, images, advertisements), special content such as *features* (moving images, audio, special reports), and *services* (offerings of multiple media forms, archives, search functions), but does not have to; a print newspaper does not include services or dynamic features. A service is commonly interactive and provided through an edition. But it can be provided exclusively, for example news delivered through Short Message Service (SMS). How the described terms are connected is shown in Figure 3.1.

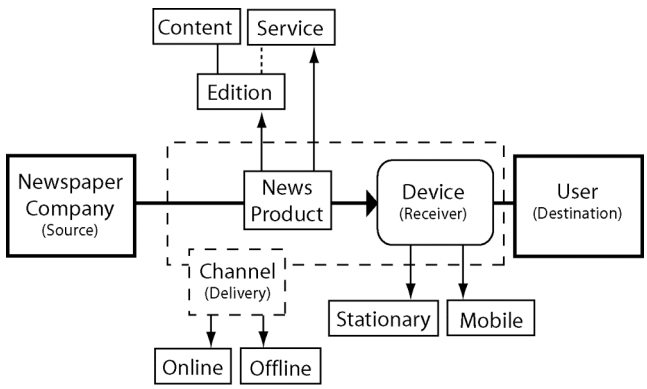


Figure 3.1 Electronic newspaper-publishing as defined here, without including the production. Production is described in Paper III-IV.

The means of *delivery* from the producer to the end-user can include both the output platform (hardware and software) and the news product; here, the means of delivery is called the *publishing channel*. *Multiple channel publishing*[8] is becoming increasingly common, as most newspaper producers have incorporated at least one additional publishing channel into the production of their traditional print newspaper. These

[8] Multiple channel publishing can also be termed *parallel publishing*, however, the news products/editions in multiple channel publishing do not have to be the same.

publishing channels are primarily electronic; here they are called *electronic* or *digital newspapers*, *editions*, or *news products*. With digital content, it is no longer clear where the boundary between media or forms of communication lies (Fidler, 1997), and at present there are no standardized terms for the various kinds of electronic newspapers.

Currently, the most common electronic channel is the one produced on and for the WWW (e.g., Molina 1997; Boczkowski, 2002). These newspapers are called online editions, online newspapers, web, or net dittos. In the present work, they will be called *online editions* or *newspapers*. Other forms of existing electronic editions are those based on digital images or digital proprietary formats of the print edition. They are consumed through a browser or application, online, and/or downloaded on a computer and consumed via software such as *Acrobat Reader* or other special applications, offline. Depending on the dynamics of these editions, they are termed portable document format (PDF) papers, electronic editions, e-editions, e-papers[9], or digital editions. Here, this type of newspaper is called a *PDF paper* if the edition is a plain and static copy of the newspaper saved in PDF format, and a *proprietary format dynamic edition* if the newspaper includes somewhat more dynamics, but is still a copy of the print newspaper in a digital format[10]. This is described further in Paper III-IV. Additional examples of electronic publishing channels are text and image services on mobile phones and handheld computers, here called *mobile services*. An emerging technology with potential for electronic newspaper publishing is the electronic paper (*e-paper*). Such potential newspaper channel is in the present work termed *e-paper edition* or *e-paper news product*, delivered on an *e-paper device*; the technology is described in the next section.

3.1.4. Display

Typically, digital media used for newspaper products are multipurpose computer devices with a larger (defined below) display, such as stationary computers and notebook computers. Computer devices with smaller displays, such as personal digital assistants (PDAs) and mobile phones, are possibly used for specialized newspaper services. Stationary computers have traditionally been the most powerful, possessed the greatest storage capacity, and had the most advanced mechanism for user input, but primarily due to the reduced size of electronic components (Rawolle and Hess, 2000:90), mobile/portable devices have seen significant developments during recent decades, and many notebook computers at present have the same or similar characteristics as stationary computers. However, with portable computers, the general rule is the smaller the computer, the less powerful it is, for example handheld computers are less powerful than notebooks (ibid.), but typically used under more mobile circumstances. Next to these multipurpose devices there are highly specialized appliances such as e-books and e-paper devices used for reading (ibid.), and devices falling in between highly specialized and multipurpose, like Tablet-PCs and mobile phones.

---

[9] Some countries, e.g. Germany, call their proprietary digital editions *e-papers*. This should not to be confused with the definition of e-paper used here, where the term refers to the technology of electronic papers (e-papers), including both the physical device and the news product.

[10] An example of this type of edition is the *Active paper* from the software manufacturer Olive Software (www.olivesoftware.com), a system commonly used by newspaper companies. See further Paper III-IV.

Presently used display technologies

Displays based on CRT and LCD technologies are the most commonly used devices for consumption of electronic newspapers. These displays are stationary (CRT and LCD) and mobile/portable (LCD). Personal computers have comparatively large screens, stationary commonly around 20 inches, and notebooks between ten to 18 inches, whereas mobile phones and handheld computers have screens of approximately five inches or less. In general, the larger the screen, the less portable the computer.

CRT and the active matrix (AM) LCD technology have recently celebrated their 100th and 25th anniversary, respectively (Crawford, 2005a). Today's display industry is largely based on rigid, glass-based devices, where the CRT technology is of decreasing importance, and a dominant space is occupied by LCDs. The AM TFT LCD is find in the high-end high-performance market, such as desktop and notebook screens, and the passive matrix (PM) twisted nematic (TN) and Super TN (STN) LCD in the inexpensive and small display module market, such as mobile phones (MacDonald *et al*., 2005; Plichta *et al*., 2005). In recent years, some displays of AM TFT liquid crystal (LC) have been good enough to compete in quality with the high-end CRTs; this is discussed in Paper I and II. Besides these display technologies, there are other markets for small camera displays, phone displays, and television displays, which include technologies such as organic light emitting diode (OLED), poly LED, electroluminescent display (ELD), and plasma display panel (PDP) (Plichta *et al*., 2005), display technologies not primarily used for personal computers.

Table 3.1 Comparisons of characteristics (approximate) of different media (Hunt, 1987; MacDonald, 1996; E ink, 2005; Joubert, 2005).

Parameter	Real scene	Newsprint	CRT display	LCD display	e-paper
Type of medium	Mixed	Reflective	Emissive	Emissive	Mixed
Dimensions	Dynamic 3-D	Static 2-D	Dynamic 2-D	Dynamic 2-D	Dynamic 2-D
Illuminant type	Sun + Lamp	Lamp	Self+Ambient	Self+(Ambient)	Self+Ambient
Luminance (cd/m2)	1000-5000	150-500	50-120	200-500	~40% of incident light
White point (K)	2000-10000	2800-6500	5000-9300	5000-9300	n/a
Surround	Mixed	Light	Dim	Dim+	Mixed-
Contrast ratio	1000:1	<10:1	200:1	≥ 400:1	>10:1
Spatial resolution	Ideal	170 dpi	90 ppi	90-140 ppi	180 ppi
Colorants	Mixed	Ink pigments	Phosphorous	Filters	Pigments+Filters
Colour gamut	Very large	Small	Large	Large	Very small

Displays can be divided into two broad classes based on their lighting sources: emissive and non-emissive. *Emissive* displays emit light, such as CRT, backlit LCD, PDP, and LED. These displays perform very well in dark conditions but tend to be 'washed out' in brighter conditions, such as direct sunlight, when reflection of ambient light matches or exceeds light emission from the display. In *non-emissive* displays, the imaging layer acts as a light valve, the films' reflectivity or transmission can be modulated electronically, such as non-

backlit LC films, electrochromic films, and most particle-based films. Crossovers are such displays as transreflective LCDs, which can operate either in backlit ('emissive') or non-backlit (non-emissive or reflective) mode. For use in portable devices, low power consumption is important for long battery life. Non-emissive displays draw (considerably) less power than do emissive displays (Amundson, 2005), and displays including *bistable* qualities even less as they need to draw power only when updating an image, not to maintain it (e.g., Jacobson *et al*., 1997; Amundson, 2005). Characteristics of display-based media in comparison to other reading media can be found in Table 3.1.

Upcoming technologies

Increased use of portable electronic devices has augmented the demand for durable, lightweight and inexpensive display components. In recent years, there has been significant research into the development of flexible display technology (FDT), much of which is still in the prototype stage when this is written in 2007. There is no precise definition of what constitutes this technology, however in broad terms, a flexible flat panel display is constructed of thin (flexible) substrates that can be bent, conformed, or rolled to a radius or curvature of a few centimetres without losing functionality (Slikkerveer, 2003, in Crawford, 2005a:3), in comparison to previously described technologies. However, some displays might be flexed only once in their lifetime, for example during manufacturing, whereas others may be rolled and unrolled more than 100 times a day (ibid.). FDTs have many potential applications, for example in low-power portable displays, wall-sized displays, fold-up displays (Gyricon, n.d.), and in odd-shaped displays (Crawford, 2005a). FDTs could also be included in applications such as intelligent shelf labelling systems, billboards, smart cards, toys, smart packaging (AFAICS, 2005), and as wearable displays integrated into garments and textiles (Crawford, 2005a).

E-paper technology

Ink on paper is a very successful medium for reproduction. It is bright and has high contrast facilitating readability, and its thinness and flexibility offer convenience for storage and portability, and it is inexpensive. *E-paper* is a FDT, or actually a collection of technologies that seeks to incorporate many of these attributes. It is envisaged, and some aspects have already come true, to be bistable and reflective, to have a wide viewing angle, high resolution and contrast, as well as to be flexible and relatively inexpensive. Unlike conventional paper, however, it is electrically writeable and erasable. Although projected to cost somewhat more than a normal piece of paper, a sheet of electronic paper could be re-used thousands of times (AFAICS, 2005; Amundson, 2005). See also Paper III-IV.

Since the 1970s, many researchers have been working hard to turn the idea of flexible e-paper into a reality (MacDonald *et al*., 2005). What makes e-paper technology development complicated, and why it has taken so long to create a commercially practical e-paper, is that all the components and processes included in the e-paper structure cannot be optimized independently, as an FDT is a complex system of linked components that must be co-developed in order to function efficiently (AFAICS, 2005; Crawford, 2005a). Two main technologies are required: the *front-plane* technology, the electronic ink that will create the actual print on the e-paper device, and the *backplane* technology, the flexible electronics required to generate the pattern of text and images on the page of electronic ink (AFAICS, 2005). The development of both technologies has proved to be

considerably more complex than was initially conceived (ibid.), where one of the main challenges is to develop high-quality flexible substrates (MacDonald *et al.*, 2005). Major flexible front-plane technologies include *electrophoretic*, *bichromal*, *electrochromic, electrowetting*, *colestric and bistable nematic LCDs*, and *OLED* (cf. AFAICS, 2005; Crawford, 2005b). Flexible displays can be built backplane technologies such as *silicon, poly-silicon,* or *organic semiconductors* coated onto very thin glass or a variety of *plastics* (MacDonald *et al.*, 2005).

Many large media organizations and developers, as well as companies specializing in e-paper technology, are developing e-papers. Most of these companies have not yet, in 2007, moved their e-paper past the prototype stage, and most prototypes are monochrome, rigid, and/or with small displays. However, many companies have announced that they will "soon" commercialize e-paper devices (AFAICS, 2005; Thomas, 2006). Until 2007, at least four e-paper devices have been commercialized, one of which is shown to the left in Figure 3.2. They were introduced in 2004 on the Japanese market, and two years later on the European and the US markets. Approximate characteristics of such devices are presented in Table 3.1.

Figure 3.2 Examples of e-papers: a commercialised e-paper, and two aspiring e-papers (prototypes) (Boumans, 2006; WFU, 1999; LG.Philips, 2007).

Other advancing display devices

One laptop per child (OLPC) is a project first presented in 2005 by Nicholas Negroponte. The project has developed a new type of portable computer called *XO*, intended for use in educating children in developing countries. The 7.5-inch dual-mode TFT display computer will be more robust, power-efficient and have higher resolution (200 ppi) than a common notebook computer. The display has two modes: transmissive, full-colour mode, and reflective, high-resolution mode, both of which consume very little power. The main drawbacks are a somewhat slower central processing unit (CPU) and less memory capacity, compared to a general notebook computer. (OLPC, 2007).

Tablet-PCs are TFTLCD-based notebook computers aimed at enhanced portability, wireless network connection, and interactive operation, including a horizontal touch screen or digitizing tablet technology, which allows the user to operate the computer with a stylus or digital pen, or a fingertip, instead of a keyboard or mouse. The idea of Tablets was first introduced in the 1960s, commercialized in 1992, and reintroduced in 2002 (e.g.,

Blickenstorfer, 2005; Toner, 2006). At present (in 2007), many notebook computers have the same characteristics, and the Tablet PC's main advantage is the touch screen function.

Developments of the Tablet PC include the *Ultra-mobile personal computer* (UMPC), a personal computer with approximately 7-inch TFTLCD-based touch screen displays, weighing less than one kilo, and with around five hours of battery life. *Mobile internet devices* (MIDs) are smaller PDA-like versions of the UMPC (e.g. Intel, 2007). Other types of display devices, which can be important for portable display-based consumption, include, for example, the *iPhone*, a multimedia telephone including iPod and camera with a 160 ppi 3.5-inch touch screen, weighing around 100 gram, and with five hours of battery life (Apple, 2007).

3.2. Theories of new media

Why do certain technologies become successful whereas others do not? Although the subject of research for decades, technical development is still hard to predict. Theories for understanding and studying new media are still in the process of being defined. This can be noted in the various theoretical approaches to new media, often melding theories and analyses from disparate fields, and the similar, but not always consistent ideas and definitions. Thus, in this type of work, there is no straightforward model or theory to apply. The theories and models summarized below are collected from technical, social and economic fields of study dealing with media and communication.

3.2.1. The influence of technology

Technology and its development can be viewed from different angles. A central controversy concerns the extent to which technology does or does not condition social change (Chandler, 2002). *Technological determinism*, *or media determinism*, is a theory that describes technology as the main force shaping society[11], limited only by the material resources available, and thus as a force that must be regarded as an autonomous system controlling and ultimately permeating all other subsystems of society (Krippendorff, 1986). Human factors and social arrangements are of secondary importance (Chandler, 2002). Determinists also view the expansion of technology as discontinuous. That is, they see technological growth not as a gradual, evolutionary process, but as a series of revolutionary leaps forward (McCormack, 1994, in Surry, 1997:19§). An influential supporter of this (*utopian*[12]) theory, which drives media determinism, is McLuhan (e.g., 1964; 1967), but also for example Toffler (1971, in Surry, 1997:20§).

Opposed to the determinist theories are the *instrumentalist* theories, also termed *developer-based* theories and *adopter-based* theories (Surry, 1997). Human control over technology is the most concrete difference; social conditions and human aspirations are considered the

[11] In economics, this is known as a "technology-push" theory rather than a "demand-pull" theory (Chandler, 2002).

[12] That technology is a positive force leading to prosperity for society and humanity, as opposed to *dystopian* determinists, who believe that technology is an inherently evil, or dehumanizing force leading to the destruction of humankind (Surry, 1997).

primary causes of change, where technological instrumentalists believe that all technology is a tool, largely under human control, that can be used for either positive or negative purposes (Surry, 1997). The technology is amoral, what counts is not the technology, but the way in which we choose to use it (Chandler, 2002). The other major difference between the two philosophies is that instrumentalists view the growth of technology as an evolutionary process, not as a series of revolutions or technological leaps (Levinson, 1996, in Surry, 1997:23§). With regard to communications media, Chandler (2002) states that the opposite to media determinism is sometimes referred to as *audience determinism* (where 'audience' could be regarded as comparable to 'adopter'), according to which instead of media being presented as doing things to people, the emphasis is on people doing things with media. Some commentators on technology and society have adopted the stance of *social or cultural determinism*, according to which technologies and techniques are entirely determined by social and political factors, which sometimes leaves as little room for individual agency as extreme technological determinism leaves for social control (Chandler, 2002). The more moderate and widespread stance is that technology is socially conditioned, but not entirely socially determined (Benthall 1976:146f, in Chandler, 2002).

Even though the theories vary in degree of determinism, many authors acknowledge that social change involves a reciprocal action between technical and social factors – where 'social' includes economic, political, legal and cultural factors (Chandler, 2002). Some commentators use the term *overdetermination*, usually meaning that a phenomenon could be attributed to multiple determinants (ibid.)

3.2.2. Diffusion theory

Diffusion theory remains a dominant theoretical paradigm for the study of new media (Leung and Wei, 2000, in Garrison, 2001:222). The theory aims to find out why some innovations are adopted quickly and why others take longer to be adopted or are even rejected (Conway, 2001:1). It is not a unified theory, most likely because it is quite a young field (Surry, 1997), and it has been developed in different disciplines, though significant formulization and unification have been accomplished by Rogers (1962; 1983; 1995; 2003).

Diffusion (social change), is a process by which something new (innovation) spreads (time) throughout (communication channels) a population (social system or market segment), including technological, political, economical, cultural, and behavioural factors; it is usually a continuous and rather slow process (Hall and Khan, 2002:1; Rogers, 2003), the development of which it is difficult to predict (Rosenberg, 1972; Lehman-Wilzig and Cohen-Avigdor, 2004; Bergström, 2005b:235). Diffusion is dependent on the *adoption* of the technology, i.e., the choice of the consumer to acquire and use a new invention[13] or innovation[14] (Hall and Khan, 2002).

[13] Making or discovery of something new (Rogers, 2003).
[14] Phase wherein individuals or collectives become familiar with inventions, i.e., accept or refuse them (ibid.).

Adoption rate of innovations

The *rate of adoption* of a new innovation depends on the perceived attributes of the innovation and varies depending on the innovation. For example, consumer innovations such as mobile phones or PCs required only a few years to reach widespread adoption, whereas other new ideas, such as using the telephone or electricity, required decades to reach complete adoption, see Figure 2 in Paper III-IV. The different rates of adoption can be explained by five characteristics of an innovation, according to Rogers (2003): its relative advantage, compatibility, complexity, trialability, and observability. *Relative advantage* is the degree to which an innovation is perceived as better than the idea it supersedes, measured in economical terms, as well as in user perception. The greater the perceived relative advantage of an innovation, the more rapid its rate of adoption will be. *Compatibility* is the degree to which an innovation is perceived as being consistent with the existing values, past experiences, and needs of potential adopters. *Complexity* is the degree to which an innovation is perceived as difficult to understand and use: the more complicated the innovation, the slower the adoption. *Trialability* is the degree to which an innovation may be experimented with on a limited basis. New ideas that are trialable will generally be adopted more quickly than innovations that are not. *Observability* is the degree to which the results of an innovation are visible to others. Innovations that are perceived by individuals as having greater relative advantage, compatibility, trialability, and observability, and less complexity, will be adopted more rapidly than other innovations (Fliegel and Kivlin, 1966; Zaltman *et al.*, 1973; Hirschman, 1981, all in Gatignon and Robertson, 1985:853; Rogers, 2003:15ff). Relative advantage and compatibility are particularly important, whereas perceived *risk* is negatively related to speed of adoption (Ostlund, 1974, in Gatignon and Robertson, 1985:862; Rogers, 2003).

Adopter categories

The *innovation-decision process* is the process through which an individual (or other decision-making unit) passes from (1) first knowledge of an innovation, (2) forming an opinion, and (3) making a decision to adopt or reject the innovation (however, a decision can be reversed at a later point), (4) implementing and using the idea, and (5) confirming the decision (Rogers, 2003). The length of the time period it takes for an individual to pass through these stages depends on the *innovativeness* of the individual – the degree to which an individual or other unit of adoption is relatively early in adopting new ideas, as compared with other members of the system – and individuals can be divided into *adopter categories*. Adopter categories include (Moore, 1991; Rogers, 2003): (1) *innovators* (2.5%)[15] – technology enthusiasts, the first group to adopt an innovation, (2) *early adopters* (13.5%) – visionaries, second to adopt, (3) *early majority* (34%) – pragmatists, third to adopt, (4) *late majority* (34%) – conservatives, fourth to adopt, and (5) *laggards* (16%) – sceptics, the last in a social system to adopt an innovation.

Earlier adopters of innovations tend to be better educated, have higher social status, and to be more mobile than later adopters. They also tend to have greater exposure to mass media and interpersonal communication, and seek information about new innovations more

[15] The number of individuals adopting a new innovation measured as normal frequency distribution.

actively than do later adopters. (E.g., Gatignon and Robertson, 1985; Rogers, 2003). The relationship between age and innovativeness is contradictory. According to Rogers (2003:288), half of the many diffusion studies on the subject show no relationship, a few found that earlier adopters are younger (e.g., Rogers, 1983; Robertson *et al*., 1984, both in Gatignon and Robertson, 1985:852), and some indicate they are older. The influence of gender on innovativeness has not been found in, e.g., Rogers (2003).

The influence of others on individuals

Imitation is a key parameter in determining the speed of diffusion (Bass, 1969, in Gatignon and Robertson, 1985:855). The effect of personal influence (e.g., word of mouth and visual imagery such as advertising) is most pronounced at later stages of the adoption process, whereas the mass media's effect is most pronounced at earlier stages (Robertson, 1971; Rogers, 1983, both in Gatignon and Robertson, 1985:855).

Opinion leadership defines the degree to which an individual is able to influence other individuals' attitudes or overt behaviour in a desired way with greater relative frequency (Rogers and Shoemaker, 1971, in Weir, 1999). Most individuals do not adopt an innovation until they learn about their peers' successful experience with a new idea. The opinion leader's role within the diffusion system is to spread these successful experiences. Innovativeness and opinion leadership are not the same thing and may or may not appear in the same person. A person who is considered an innovator might be predisposed to trying new things, to experimenting with new ideas, whereas an opinion leader is typically the person relied upon for information about new ideas and products (Weir, 1999).

Critical mass is the point at which a sufficient number of individuals in a system have adopted an innovation so that the innovation's further rate of adoption becomes self-sustaining. The amount of time required to reach critical mass for a new product in a nation is called *time-to-take-off*. Critical mass is fundamental to understanding a wide range of human behaviour, because an individual's actions often depend on a perception of how many other individuals are behaving in the same way (Schelling, 1978, in Rogers, 2003:349). A *threshold* is the number of other individuals who must be engaged in an activity before a given individual will join in on that activity (Granovetter, 1978; Markus, 1989, both in Rogers, 2003:355).

A technology has a *network effect* when the value of the technology to a user increases with the number of total users in the network, and this is important during all phases of adoption (Hall and Khan, 2002). Katz and Shapiro (1985) identified three types of network effects: *Direct* network effects are present when a user's utility from using a technology directly increases with the total size of the network, for example the use of e-mail and telephone. Direct network effects would be particularly important to information technologies. *Indirect* network effects also arise from increased utility due to larger network size, but in this case the increase in utility comes from the wider availability of complementary products, for example the relationship between hardware-software products. *Post-purchase* network means that the greater number of a product that is sold, the easier it is to obtain parts for it; this applies, for example, to cars.

The adoption curve

The rate of adoption is usually measured as a function of time. If numbers of individuals adopting a new idea are plotted on a cumulative frequency basis over time, the diffusion process has been generally assumed to follow a sigmoid pattern, an *S-shaped* curve, as exemplified in Figure 3.3; this curve is also common in the biological world (Shapiro and Varain, 1999).

It seems natural to imagine adoption proceeding slowly at first, accelerating as it spreads throughout the potential adopters, and then slowing down as the relevant population becomes saturated (Garrison, 2001: 233; Hall and Khan, 2002:5; Rogers, 2003). The S-curve is innovation- and system-specific. Some new ideas diffuse relatively rapidly, resulting in a curve that is quite steep, whereas other innovations have a slower rate of adoption, showing a slope that is relatively gradual (Hall and Khan, 2002:9; Rogers, 2003). Another way of describing the number of individuals adopting a new innovation is through a normal frequency distribution, a bell-shaped curve, measured as mean and standard deviations.

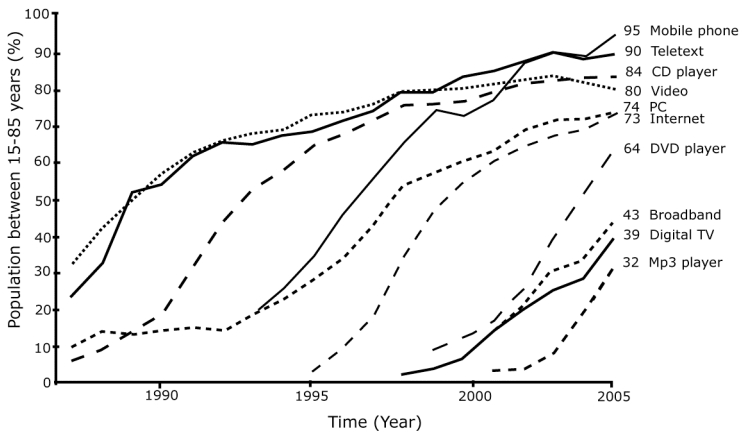


Figure 3.3 Adoption of new media technology between 1997-2005 among the Swedish population. (Modified from Dagpresskollegiet, 2007).

Diffusion effects on the market and technology

The contributions of a new technology can mainly be realized when and if it is widely diffused and used. The diffusion itself can be seen as the cumulative or aggregate result of a series of individual calculations that weigh the incremental benefits of adopting a new technology against the cost of change, often in an environment characterized by uncertainty (as to the future evolution of the technology and its benefits) and limited information (about both the benefits and costs and even about the existence of the technology) (Hall and Khan, 2002:3). To be successful, an innovation has to be advantageous for both producers and consumers (Schumpeter, 1997:208ff, in Stöber, 2004:497.) For the producers, the benefits are in many cases simply the difference in

profits when they shift from an older technology to a newer one. In the case of consumers, the benefits are the increased utility derived from the new product, but also factors such as the enjoyment of being the first with a new product (Hall and Khan, 2002:8).

The producer

One of the most consistent patterns in business is the failure of leading companies to stay at the top of their industries when technologies or markets change (Bower and Christensen, 1995:43). For the producer, adoption of new technology is often very costly for various reasons: investments in production, training of workers, marketing, and research and development. Consequently, firms want to be assured that there will be income in the future to pay for the investment, as most technologies involve large upfront costs (Hall and Khan, 2002:10ff). One of the fundamentals of a successful business strategy is to supply what the customers want (Grant, 2004), but not stay too close to the customers (Bower and Christensen, 1995:43). Thus, as regards adopting or not, the main questions for firms are whether they can or cannot recoup the costs of adopting a new technology, the time it will take to recover the cost (Hall and Khan, 2002:10ff), and whether they should adopt even if the technology does not immediately meet the needs of mainstream customers (Bower and Christensen, 1995:43).

The market structure of innovation and diffusion has been debated. Market power has been argued to both encourage and discourage the diffusion process. Firms that are large or have large market shares are more likely to undertake innovation, both because appropriability (the benefits of a new technology) is higher for larger firms, and because the availability of funds (the costs of new technology adoption) to these firms is greater. A large firm can adopt the technology sooner because it can capture the economics of scale from production via the learning curve more quickly, spread out the other fixed costs associated with adoption across a larger number of units, and experiment with a new technology while keeping the old one operating at the same time (Arrow, 1962; Dorfman, 1987, both in Hall and Khan, 2002:20f). However, large size and market power may also slow down the rate of diffusion. Larger firms have multiple levels of bureaucracy that can impede decision-making processes about new ideas and projects and the hiring of workers (Hall and Khan, 2002). It may also be more expensive for older and larger firms to adopt a new technology because they have many resources and human capital sunk into the old technology and its architecture (Henderson and Clark, 1990, in Hall and Khan, 2002:22).

The consumer

An innovative idea per se is not sufficient for success in the marketplace; significant support from consumers is necessary for the survival of any new medium (Son and McCombs, 1993). The speed of diffusion of technological innovation depends on the consumers' ability to develop new knowledge and new patterns of experience (e.g., Robertson, 1971; Hirschman, 1980; Houston, 1983, all in Gatignon and Robertson, 1985:853); the more homogeneous the social system, the faster the diffusion rate (Gatignon and Robertson, 1985; Rogers, 2003). But given the public's usual technological conservatism, only if their evaluation is truly positive will the new medium have any chance of passing the 16% threshold (Lehman-Wilzig and Cohen-Avigdor, 2004:713). Most new products do not (Levitt, 1965).

The product

Rosenberg (1972) argued that one of the reasons for the slow, but eventually complete, diffusion of new technologies depends on the ability to both improve, and lower the cost over time. If a technology is imperfect in its early stage, then the subsequent rate of improvement is an important determinant of adoption of the technology. This is because the efficiency gained from the new technology is much larger during its enhancement stage (years following its initial introduction) than during its initial stage. However, as product quality/performance may change over time, early adopters may experience different levels of product satisfaction than do later adopters (Gatignon and Robertson, 1985:854; Kalish and Lilien, 1986). Reasons for fast growth of a medium when it starts to take off are suggested to involve the following (Lehman-Wilzig and Cohen-Avigdor, 2004; Stöber, 2004): Culture (openness to novelty), cost-benefit utility ('bang for the back'), user-friendliness (human-machine interface), and the nation's technological infrastructure (human and physical), and standardization.

The timing of a new product/new technology entry into the marketplace is an important, often critical decision, and because technology is evolving so rapidly, the timing of strategic moves is even more important to the information industry than to many others (Shapiro and Varain, 1999). An entry made too early may risk pushing an undeveloped product into the marketplace (Kalish and Lilien, 1986), though some technologies may be better off if 'something' is introduced on the market that both customers and producers can learn from (Bower and Christensen, 1995). A medium 'not ready for prime time' could undergo significant change (become cheaper, improve in quality, gain more functions, etc.) and succeed in a second interaction, and furthermore be helped along by business acceptance (e.g., provide access if not affordable and teach the necessary skills) (Lehman-Wilzig and Cohen-Avigdor, 2004). A new communication technology can also begin as a 'niche' medium. However, a product may sacrifice sales if entry is delayed too long (Kalish and Lilien, 1986), or if the product is introduced at the wrong time. Bad timing can lead to the technological equivalent of 'sudden infant death syndrome'. If an incremental innovation appears at the same time as other radical media inventions, the former will not pass the market penetration stage, Figure 3.4, for example closed-platform videotex emerging around the time of open-platform personal computers (Lehman-Wilzig and Cohen-Avigdor, 2004).

The life cycle of new media

The *product life cycle* describes the succession of stages a product goes through during its lifetime. The life cycle of a given product may be different for different companies in the same industry and at the same point in time, and may affect companies in the same industry differently (Levitt, 1965). The product life cycle basically consists of four stages, or five if the initial idea or *birth* stage, i.e., technological invention, is included; see Figure 3.4. The *market penetration* stage (0-16%) is when the new product or innovation (in this case the medium) enters the market, before there is a proven demand for it, and often before it has been fully tested technically (Levitt, 1965). At this stage, the medium is usually undergoing rapid change, both physically (technology) and content-wise (message and presentation). During this stage, the innovation has several possibilities: premature demise, long-term stasis (cocooning), or immediate success, all depending on endogenous factors (the technology's capabilities) and exogenous factors (social readiness and opinion

leaders' acceptance) (Lehman-Wilzig and Cohen-Avigdor, 2004). If successful, it passes to the next stage: *growth* (16-50%). First it experiences problems of 'finding its own voice', then inventors-originators begin to lose control over the young medium, as use and sales start to take off. Within a decade or two of commercial introduction, 50%[16] audience penetration will be achieved (ibid.).

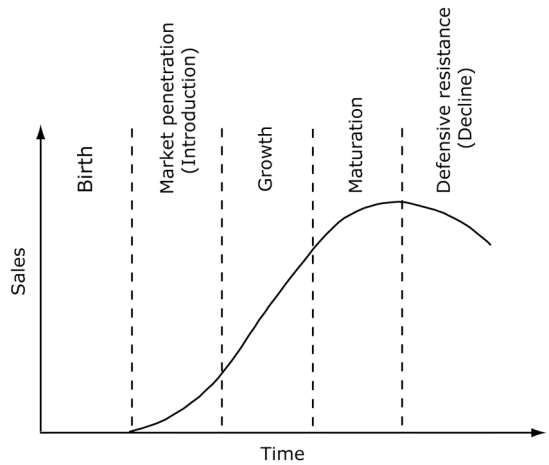


Figure 3.4 The stages of the product life cycle.

Past the 50% user mark, the not-so-new medium becomes a routine part of media users' repertoire; it has reached the *maturation* stage (50-90%). The first sign of this advent is evidence of market saturation (Levitt, 1965). This stage is reached by marketing, fixing technical problems, driving technical improvements faster, and responding to the needs of late adopters. Second, economies of scale lower production and appliance purchase costs, and more competent providers become involved, further expanding the innovation's attractiveness for the consumer (e.g., software programmers for video games). And third, many content providers become involved, further expanding the attractiveness for the consumers. But the further moving into this stage, the finer differentiations of the product are needed, as competition now becomes intense (ibid.). Depending on the product, this stage may be passed through rapidly, or can persist for generations if there are no important competitive substitutes, or actually never be attained. Sooner or later, however, the established medium will be threatened by other, younger media, usually new, but on occasion merely less senior, at which point the *defensive resistance* stage (90-50%) has been reached (Lehman-Wilzig and Cohen-Avigdor, 2004), where the 'old' product begins to lose consumer appeal. This does not necessarily happen immediately: (1) A new medium can offer a service that did not exist heretofore, (2) the new medium is threatening to one specific medium, and/or, (3) the decline of the older medium may not occur immediately; the traditional medium may still improve and actually increase revenues for a while. How does the old medium react? The outcomes of this stage, suggested by Lehman-Wilzig and Cohen-Avigdor (2004), are three possible ways, depending on the medium's technological capabilities and the degree of perceived or actual threat of the new medium:

[16] Innovators + early adopters + early majority.

adaptation, *convergence* or *obsolescence*; these aspects are discussed further in Section 3.2.3. Depending on the outcome of this stage, the result may be a new product life cycle.

The 30-year rule

When predicting the adoption of technological inventions, it is popular to incorporate the *30-year rule*, which is loosely based on diffusion of innovations. Coined by Saffo (e.g., 1992), the 30-year rule claims that the time required for new ideas to be fully adopted into a culture has consistently averaged about three decades, and that impressions of spontaneous technological advancements are generally wrong. Laboratory breakthroughs nearly always take longer to become successful commercial products or services than anyone expects, and technologies that appear to have suddenly emerged as successful have often been under development for much longer than anyone admits. Technological innovations may seem to be developed and adopted much faster in the digital age than they did in the past. Saffo (1992) claims that the reason is not that individual technologies are adopted at a faster rate, but that more technologies are initiated at the same time. It is the unexpected cross-impact of maturing technologies that creates this powerful acceleration, and this is one reason why the forecasting of new media is so difficult. Fidler (1997) argues that the 30-year rule is the rule rather than the exception for emerging technologies, and claims that, though it may not be foolproof, it does put the development of new technologies into a more realistic perspective.

Saffo (1992) also states that many companies and organizations typically suffer from *techno-myopia*[17]. Techno-myopia refers to a tendency to overestimate the potential short-term impacts of a new technology, and when it fails to meet expectations, to underestimate its long-term implications.

Classification of innovations

Robertson (1967) classifies innovations in terms of their effects on established consumer patterns: *Continuous innovation* means to change or improve an already existing product, such that adopters still use the product in the same fashion as they did before. *Dynamically continuous innovation* is either a new product or a radical change in an existing one. The consumption pattern is somewhat changed. *Discontinuous innovation* is a totally new product, thus it entirely changes the consumers' buying and use patterns. According to Atkin and LaRose (1994, in Lehman-Wilzig and Cohen-Avigdor, 2004:711), most new media inventions are continuous innovations, whereas Hirshman (1980, in Gatignon and Robertson, 1985:863) states that technological innovations are likely to be more discontinuous in their effects on established consumption patterns.

Disruptive technologies

The concept *disruptive technologies* (e.g., Levitt, 1960; Bower and Christensen, 1995; Christensen 1997; Christensen and Overdorf, 2000) concerns the adoption of technologies so new and dramatically different that they are characterized as disruptive. While organizations customarily are good at responding to evolutionary changes in their markets as long as new technologies address the next-generation performance needs of their

[17] Also called *macromyopia* in Saffo (1992).

customers, called *sustaining technologies* (or innovations), they typically are not good at responding if the new technologies do not immediately meet the needs of their mainstream customers; such new technologies are called *disruptive technologies*. Thus, sustaining innovations improve product performance or increase productivity for existing products within markets, especially giving firms first-mover advantage. Whereas disruptive innovations, emerging much less often, overturn the existing dominant technology or product in a market, either by filling a role in a new market that the older technology could not fill, or by successively moving up-market through performance improvements until finally displacing the older technology. Disruptive innovations will often have characteristics that the traditional customer segment may not want, at least not initially. Such innovations will appear as cheaper, simpler and even of inferior quality if compared to existing products, but some marginal or new consumer segment will value it. For example, Christensen (1997) states that traditionally successful large corporations – those that are well managed, pay attention to their customers, and invest in new technology – are vulnerable to being outwitted by a disruptive innovation. The companies may see the disruption coming, but do not do anything until it is too late, making late entries into markets already filled with powerful players.

3.2.3. Media evolution

Perhaps the most widely discussed factor in theories of new media is *convergence*, commonly used to mean a technological merging (Lehman-Wilzig and Cohen-Avigdor, 2004:710) and/or blending of technological capabilities to deliver content on multiple platforms through computer-driven distribution systems (Lawson-Borders 2003:92). Convergence is, however, an elusive term that is used in multiple contexts and is often ambiguous in its definition, as it occurs on various levels and through several media-related processes: technological, economical, social, global and cultural (Badgdikian, 1990; Palvik and Dennis, 1993, in Cooke 2005:24; Jerkins, 2001, in Lawson-Borders 2003:92). Cooke (2005:25) describes these processes as follows: *Technical convergence* typically refers to either the blending of technologies, or the sharing of information through digitalization. Consider, for example, online newspapers that combine web-TV and other forms of dynamic media with traditional newspaper content and presentation styles into one appliance, or for example multiple-channel publishing, where editing and formatting of information from a single content source are produced on multiple media outlets. *Economic convergence* is, for example, the consolidation of media companies by conglomerates, which results from the fact that media are bound together by the economic, political, and social parameters of their existence. Convergence of production methods and technologies results in economic convergence as well. The convergence of media outlets, technologies and processes creates a unique *cultural/visual convergence*, an environment in which designs distinctive for one medium can easily be appropriated by other media, which is significant because a single communication style is no longer predicated on and for a specific medium. The blending of visual styles and media output forms on the WWW is perhaps one of the best examples of this, according to Bolter and Grusin (2000), but it is also present in many other media.

Theories of media interactions

Many theories and models of media interactions are based on the idea of competition and co-existence in some form, often connected to ideas from biological evolutionary theory, where convergence plays an important part in addition to adaptation and obsolescence. The relationship between the theories and models presented below (in the titles termed 1-4), are described in the end of the section.

(1-2) Theories of functional differentiation – the zero-sum property

Zero-sum describes a situation in which something can only gain at the expense of something else, and exist only where there is a fixed supply of a resource.

Principle of relative constancy

The basic idea of the *principle of relative constancy* is that there is a zero-sum property that applies to what consumers and advertisers will spend on mass media. Thus, if money is spent on a new medium, it will be at the expense of older media. However, spending on the part of consumers and advertisers is determined by the general state of the economy. As the economy expands, spending on mass media expands, and similarly, when the economy contracts, less money is spent on mass media. In short, new media must obtain their economic support either from the expansion of mass communication money generated by growth in the general economy or by taking money away from existing media. The third logical source of funding – reallocation of money from non-media expenditures to mass communication – is declared out of bounds by the principle of relative constancy (McCombs and Nolan, 1992). The principle was first empirically tested in 1972 by McCombs, who examined empirical data on spending on mass communication from 1929 to 1968, and later reaffirmed by McCombs and Eyal (1980) using data from 1968 to 1977.

The principle of relative constancy has been criticized for not being able to hold up in the past decades' increasing development and availability of electronic media (e.g., Wood and O'Hare, 1991; Glascock, 1993; Demers, 1994 all in Lacy and Noh, 1997:4; Dimmick, 1997:34; Dupange 1997:4). Wood and O'Hare (1991) argue, however, that relative constancy works in an historical perspective of mass media spending, and Son and McCombs (1993) state that the principle is accurate in its long-term characterization, with only short-term exceptions to constancy. The principle of relatively constancy has also been criticized for not being a theoretically based hypothesis, but simply an unexplained empirical generalization (e.g., Dimmick, 1997; Dupange 1997; Lacy and Noh, 1997), though it has helped scholars better understand mass media economics (Lacy and Noh, 1997).

Displacement model

An aspect related to the relative constancy theory is the spending of time on media consumption. McCombs (1972) wrote that the two factors that will jointly constrain the growth of mass media in the immediate decades ahead are time and money. The media *displacement model* also accounts for the zero-sum property, suggesting that existing patterns of media use will be 'restructured' with the introduction of a new medium

(Krugman, 1985, in Chan and Leung, 2005:363); that is, because the amount of time available for media use is limited, the introduction of new media activity will result in a corresponding reduction in the time spent on other media activities and/or non-media tasks (Kayany and Yelsma, 2000; Robinson *et al*., 2000; Chan and Leung, 2005: 363).

Despite the logical appeal of the displacement model, research findings have not consistently supported it. Studies that affirm the model have found a symmetrical relationship (increase-decrease) between new and existing media (e.g., Kayany and Yelsma, 2000; Dimmick *et al*., 2004), however the replacement effects of television are greater than for other media such as newspapers (e.g., Bromely and Bowels, 1995; Kayany and Yelsma, 2000; Adoni and Nossek, 2001). Several other models have found support for a complementary relationship (increase-increase) between new and traditional media – quite contrary to the prediction of the displacement model (e.g., Robinson *et al*., 1997; 2000; Althaus and Tewksbury, 2000[18]; Stempel *et al*., 2000; Adoni and Nossek, 2001[19]; Cai, 2005; Chan and Leung, 2005; Nguyen and Western, 2006). Finally, some studies have found no evidence of either a symmetrical or complementary relationship between new and existing media (e.g., Bromely and Bowels, 1995; Althaus and Tewksbury, 2000; Stempel *et al*., 2000).

These conflicting findings may be explained by the fact that digital media consumption is still new. Because digital media technology is still developing, consumption patterns are rapidly changing. When a technology is new, the novelty of the medium may explain part of the time displacement effects (Kayany and Yelsma, 2000). Moreover, the functional niche of any new medium is not created instantaneously, but over time. Hence, it may be too early to examine whether functional displacement has occurred as a result of online media. Furthermore, Cai (2005) suggests that data on time displacement effects have often been collected using simply survey questions, indicating that the respondent's judgements might not be accurate and that such questions only provide a rough measurement of changes over time.

Theory of the niche

As with the displacement model, *the theory of the niche* holds that consumer time is a crucial resource that all media compete for (Dimmick *et al*., 2004), and thus could be seen as a part of the previous theory. The theory of the niche aims to describe and explain why the fact that various life forms depend on the same limited resources leads to competition, resource partitioning, exclusion or coexistence (Leibold, 1995). *Niche overlap* defines the degree to which populations depend on the same resources, and can be used as a measure of the degree of similarity or competition between two forms (Dimmick and Rothenbuhler, 1984). If overlap is great, i.e. if competition is very intense, the competitively superior population may appropriate the niche space of the other competitor (Dimmick, 1997), whereas less overlap indicates that they meet different needs, and that more complementarity exists between them (Dimmick *et al*., 2004). If the appropriation of niche

[18] Althaus and Tewksbury (2000) concern newspaper and internet here, and television and internet below.

[19] Stempel *et al*. (2000) and Adoni and Nossek (2001) concern newspapers and internet here, and television and internet above.

space is only partial, *competitive displacement* (see the above described model) has taken place; if the appropriation of the other population's niche is total, *competitive exclusion* has occurred (Dimmick and Rothenbuhler, 1984; Dimmick, 1997). The theory of the niche specifies that there must be some critical difference in the niches of forms in order for them to coexist. Hence, there is an upper limit on niche overlap beyond which displacement or exclusion will occur. This implies that when a new form invades an established community, overlap between the two or more forms may initially be high. Over time, however, the competitors may evolve differently in terms of resource utilization, lowering niche overlap and allowing the different forms to coexist (Dimmick and Rothenbuhler, 1984).

The theory of the niche is of bio-ecological origin, but can be applied "in any situation in which clearly defined populations compete for limited resources" (Dimmick *et al.*, 1993:14, in Dimmick, 1997:37). The application of concepts from bio-ecology to human social organizations is not a new idea (Dimmick and Rothenbuhler, 1984). For example Dimmick and Rothenbuhler (1984), Dimmick (e.g. 1997), Kayany and Yelsma (2000), and Dimmick *et al.* (2004) have used the theory to study the competition of new and older media forms in order to explain the consequences of the rise of a new medium. The most common consequence is displacement, which is of vital importance to media industries and consumers (Dimmick *et al.*, 2004). Kayany and Yelsma (2000:218) suggest that displacement in media has occurred several times in the past. For example, in 1937, newspapers were the primary news source for the US population, but in 1945, radio became the primary news source for the majority (Lazarsfeld, 1940, in Dimmick, 1997:37), and in 1972, television became the primary news source for most Americans (Dimmick and Rothenbuhler, 1984).

(3) Theories of functional multiplicity

According to several media theorists, development of media technology and visual styles among media are rooted in co-evolution and convergence. Although the theoretical approaches to the subject differ, media theorists claim that new media must be understood in relation to their predecessors, because they draw on the technologies, functions, and design conventions of 'old' media as they evolve.

Manovich (2001:13) contends that the study of new media must be grounded in the past and present study of the arts, computer technology, popular culture, and information design, as they are all interconnected through society. The visual language that Manovich (2001) develops 'from the ground up' is not a direct application of an existing literally or cultural theory, nor is it a fully formed theory. Instead, it is a set of principles – modularity, automation, variability and transcoding – that comprise 'the identity' or 'language' of new media (Cooke, 2005).

Bolter and Grusin's (2000) core idea of the emergence of new media technologies and the development of presentation styles is based on 'repurposing': to take a 'property' from one (old) medium and use it in another (new medium), not necessarily with a conscious interplay between the media. The idea is connected to, for example, McLuhan's (1964) analysis of the remediating power of various media, but rejects his technological determinism. Bolter and Grusin (2000:45) call this representation of one medium in

another *remediation*, and argue that "remediation is a defining characteristic of the new digital media". Bolter and Grusin (2000) put forward remediation as a theoretical framework for understanding the process by which new media and older media influence one another, in contrast to Manovich (2001) (Cooke, 2005). There are different levels of remediation, according to Bolter and Grusin (2000). At one extreme, the older medium is highlighted and represented in the digital form without critique: *transparency* is the goal. Other forms of remediation seem to want to emphasize the differences rather than erase them, such that any borrowing from older media may be said to be *translucent* rather than transparent. More aggressive forms of remediation involve an entire refashioning of the older medium, but still marking the presence of the old medium, thus maintaining *multiplicity*. Finally, the new medium can remediate by trying to *absorb* the older medium entirely, so that the discontinuities between the media are minimized. However, the very act of remediation ensures that the older medium cannot be entirely affected; the new medium remains dependent on the older medium in acknowledged or unacknowledged ways. Remediation operates under the current cultural assumptions about immediacy and hypermediacy. *Immediacy* causes the viewer to forget the presence of the medium, and *hypermediacy* makes the viewer aware of the medium, sometimes evoking a desire for immediacy (Bolter and Grusin, 2000).

Fidler (1997) argues that the birth of a new medium never happens spontaneously or independently, but always emerges gradually from the metamorphosis of other media technologies, through a complex interplay of aspects of the cultural context, such as perceived needs, competition, political pressure and social and technological innovations, which either accelerate or slow down a new medium's evolution. Fidler calls this process *mediamorphosis* – a unified way of thinking about the technological evolution of communication media. Metamorphosis derives from three concepts: co-evolution, convergence and complexity. Fidler (1997:23f) states that "[a]ll forms of communication are tightly woven into the fabric of the human communication system and cannot exist independently from one another in our culture. As each new form emerges and develops, it influences, over time and to varying degrees, the development of every other existing form. Co-evolution and coexistence, rather than sequential evolution and replacement, have been the norm…" However, as the principle of mediamorphosis states, "established forms of communication media must change in response to the emergence of a new medium – their only other option is to die" (Fidler, 1997:23). A basic part of this process is convergence, crossing of paths, which results in the transformation of each converging entity, as well as the creation of new entities. Thus, according to Fidler, just as species evolve for better survival in a changing environment, so do forms of communication and established media.

(4) Theory of functional equivalence

Supersession

A more hardcore form of displacement is *supersession*. Fundamental to the idea of supersession is the rhetoric of technological revolution built on the premise that each new medium will replace (vanquish or subsume) an old medium (Dutta-Bergman, 2004), discouraging the idea that old technologies can tell us anything about new ones and leaning heavily on the language of postmodernism (Duguid, 1996). In general, supersession

assumes that information stands aloof from the technology that carries it. Claims of supersession have been put forward by rapid technological development, which has increased the pressure to sell the new on the heels of the old, no matter how durable the old. The new, by implication, does not merely replace the old; it supersedes it (Duguid, 1996:68). Criticism of supersession has been that "those who forget the past are condemned to repetition", but that the problem of supersession may require stronger remedies, where "naïve ideas of supersession may actually be making some forms of repetition difficult rather than inevitable" (Duguid, 1996:70).

Outcomes of theories of media interactions

Based on the theories and models presented in this chapter, and mainly in the present section, four approximate outcomes of competition and coexistence of old and new media are suggested, where the numbers refer to the above presented titles, and the theories and models they represent: (1) functional differentiation, co-existence, or complementarity – the two coexist; (2) functional displacement, niche or interchangeability[20] – the two find a way to coexist on the expense of one's space; (3) functional multiplicity, convergence or co-evolution – both media adapt and merge into one multifunctional unit; or (4) functional equivalence, functional substitution, exclusion, extinction or 'mediacide' – predicting the death of traditional media. A dialectic model of these interactions is shown in Figure 3.5.

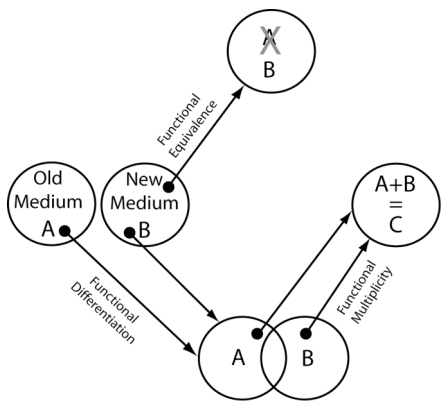


Figure 3.5 Dialectic model of media interactions, based on Adoni and Nossek (2001).

As described in the section *The life cycle of new media*, the outcome of the cycle could be adaptation, convergence, or obsolescence. In general terms, (1) and (2) described above could also be referred to as adaptation, (3) as convergence, and (4) obsolescence. However, in biological terms, convergence is also a form of adaptation (e.g., Curtis and Barnes, 1994). In theories of new media the definition between adaptation and convergence is not straightforward, and the extreme outcome of Options 1-2 is obsolescence, thus the theories and models described above, overlap.

[20] Also a form of functional differentiation.

3.2.4. Uses and gratification approach

Not directly used in the present work, but by works cited here, *uses and gratification* is not a single theory, but a body of approaches developed from functionalist theory in the 1960s and 70s as a counteraction against traditionally used models such as the 'hypodermic needle' or 'magic bullet', which advocate the notion that media consumers are a passive audience, which can deliberately be altered or controlled (Brown, 2000). A consumer-oriented perspective is the core of the approach, and it defines media consumption as an active process, whereby individuals attempt to satisfy some of their psycho-social needs though selective self-exposure to specific media and contents (Adoni and Nossek, 2001). The theory was initially presented by, for example, McQuail *et al.* (1972) and Katz *et al.* (1974)[21], but has been developed in a variety of directions over the years.

Using or not using a new medium is largely a question of function ('why') and of the time available, in combination with habits and daily practises. In the uses and gratification perspective, the user's choices of newspaper and newspaper content largely constitute an active undertaking, even though it may become more routine and less conscious over time. Thus, a distinction has been made between content gratifications or instrumental use, on the one hand, and process gratifications or ritualized use, on the other (Rubin, 1984, in Bergström, 2006:4). *Instrumental* use is intentional and exposure is selective to a specific content. *Ritualized* use is associated with habit and related to the medium rather than content (Bergström, 2006:4).

The theory has been criticized, among other things, for being vague in its concept and non-theoretical (Blumer, 1979; Severin and Tankard, 1997), in that it focuses mainly on the individual and neglects the social context of media use (Elliott, 1974, in Severin and Tankard, 1997:297) and starts from the view that media are always functional for people, and that people are always free to choose the media fare and make the interpretations they want (Ang, 1990; White, 1994, in Severin and Tankard, 1997:298).

[21] Both in Severin and Tankard (1997:294ff).

CHAPTER 4

THE NEWSPAPER MARKET

Prediction of the demise of old media is indeed as old as the media themselves (Nguyen and Western, 2006), and several times the newspaper medium has been doomed to extinction (Weibull, 2005). One main concern about the newspaper industry is the introduction of new electronic media, which has profoundly changed the media landscape, affecting ownership, sales, production, content, and consumption.

4.1. The producer perspective

The declining figures for newspaper circulation, and the declining revenues from advertising, are pointed out as one main cause of an alarming threat to the newspaper medium and the newspaper industry's future prosperity; several factors have been suggested to underlie this development. However, whether the newspaper industry is a prosperous or a declining industry, whose future is in great doubt, is rather ambiguous, and which picture emerges, depends on the source, the market studied, and the measurement approach used. Nevertheless, the newspaper market is changing, and the question is how the newspaper industry is going to meet the challenges that lie ahead.

4.1.1. Newspaper business models

Like every other business, a newspaper company sells products to raise revenues and, in doing so, incurs costs when buying the raw materials, labour and services needed to produce its products. Very simply put, if revenues exceed costs, a newspaper company will have achieved profitability (Sparks, 2000). The *business model*[1] for traditional printed newspapers is rather well known (ibid.). A newspaper company operates in two markets: The *consumer market* is measured by circulation counts from two primary sub-product markets: subscriptions and single-copy sales (Picard and Brody, 1997). The *advertising market* is measured in number of sold advertisements[2]. In most European countries, revenues from circulation and advertising are of approximately equal importance (Picard and Brody, 1997), whereas in the United States, advertisement sales account for around 80% of revenues (cf. Picard and Brody, 1997; Mings and White, 2000; Sparks, 2000). The typical main costs for newspaper companies are associated with newsprint (paper), printing, and distribution, which account for about half of the total costs, and personnel

[1] There is no single, comprehensive and cogent taxonomy for the definition of a *business model* available, but it can be described as a summary of how a business transforms technical inputs (e.g. products, feasibility, and performance) into economic outputs such as value, price and profits, i.e. the mechanism by which a business intends to generate revenue and profits (e.g., Timmers, 1998; Petrovic *et al.*, 2001).

[2] Classified ads are, however, within the boundary of both these markets, as part of the revenues comes directly from consumers (Turpeinen, 2007).

costs account for the other half (TU, 2006a:7). The business model, however, depends on several factors, for example type of newspaper (e.g., morning or evening) and areas of distribution (e.g., national or local).

To find successful business models for new electronic channels are a main conundrum for the newspaper companies, and such models have yet to be developed. Existing models are based, for example, on subscriptions to the website of the newspaper, on subscriptions to the digital equivalent of the print edition through a service, such as *Newsstand* (Walter, 2001:16), and/or pay-peer-view of specific content.

4.1.2. Measurements of newspaper utilization

When studying newspaper utilization, one can either measure reach or reading frequency (Langschmidt, 1982; Tennstädt and Hansen, 1982, both in Bergström, 2006:5). Newspaper circulation is commonly measured in terms of *audience reach,* the number of sold copies of the print newspaper, a number that is declining in the Western world (e.g., Molina, 1997; Neuberger *et al*., 1998; Ewart, 2003; Boczkowski, 2004), but not according to the *World Association of Newspapers* (WAN) (Loechner, 2007). Other ways of measuring are newspaper readership and total audience reach. *Readership* is a larger figure than circulation, and the *Newspaper Association of America* (NAA) (2005a:17) reports that daily newspapers average 2.4 readers per copy (in the US), and WAN (2006) estimates that the average readership of newspapers in the world is more than a billion readers each day, however, this figure is also slowly declining in the European and US markets[3]. *Total audience reach* means that *all* newspaper editions are included in the audience count, and by this standard, the typical newspaper company's audience is not shrinking, but growing (SNM, 2005; WAN, 2006). Another way of measuring is by adjusting the changes in daily newspaper circulation to the *growth of circulation over time*, using a circulation per 1000 population figure. This measure gives an indication of penetration of newspapers, the degree to which they are reaching their audiences when, for example, the population changes. By this measure, Japan, Norway, Finland, and Sweden had the world's largest consumption of print newspapers in 2005 (TU, 2006a:26; WAN, 2006). Thus, measurements and statistics of newspaper utilization diverge somewhat depending on country, organizations, definitions, etc.

4.1.3. Why new media are a threat

Measurements of newspaper circulation almost exclusively include *print* newspapers, for reasons described in Chapter 3, and *the* threat to the newspaper industry[4] is the losses in daily circulation, which have been increasing slowly since the beginning of the 1990s (Picard and Brody, 1997:18; Antoni, 2003:157; SNM, 2005).[5] From 1994 to 2004, the

[3] Concerns frequent readership. The less frequent readership of print newspapers has been stable the last 25 years, at least in Sweden (Sternvik *et al*., 2005:88).

[4] The present work concerns the newspaper industry in Europe and the US newspaper markets, if nothing else is mentioned.

[5] However, in recent years, the total figure for global newspaper circulation actually increased, in large part due to the increasing Asian newspaper market (WAN, 2006). More than 439 million

relatively small changes accounted for a decline of 12% of the Swedish daily newspaper circulation, 20% in Denmark, 6% in Finland (NMP, 2006) and 12% in the US (NAA, 2005a:19). Another main concern is the media generation gap. Newspapers, among other traditional media outlets, are losing young consumers[6] (e.g., Picard and Brody, 1997:134ff; Weibull, 2004; Aris and Bughin, 2005:238; Wadbring, 2006), their future customer base. Another potential threat is the entry of actors not traditionally considered as news media providers. Digitalization has opened up the area to organizations such as network companies, internet service providers (ISPs), and equipment manufacturers, which are now included in the value chain (Aris and Bughin, 2005). For the (traditional) media industry, this means a significant increase in competition, often by actors that may have a strong financial backbone and direct access to consumers (ibid.). A further main threat is the loss of revenues from advertising. These threats are described further in the following text.

Migrating advertising money

In the Scandinavian countries and most of the European countries, the print newspaper is the largest advertising medium, attaining more than 30% of the total average advertising shares (TU, 2006a:25), whereas in the US, by far the largest newspaper advertising market in the world, the print newspaper is surpassed by the television medium. In recent years, the newspaper advertising market has increased worldwide (WAN, 2006), yet these increments are rather modest, and do not include all countries, for example Sweden (TU, 2006a:18).

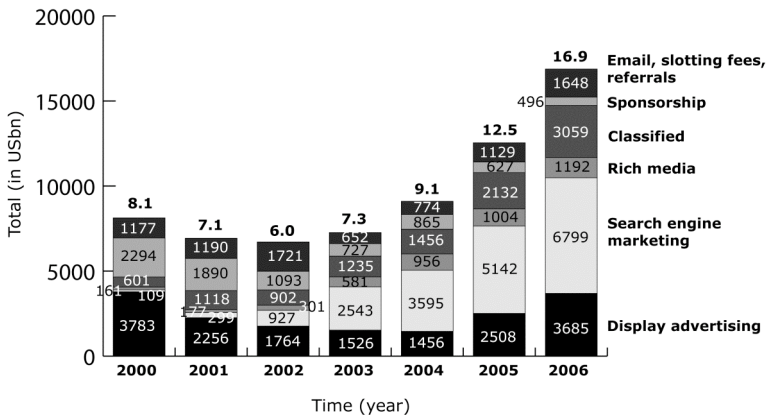


Figure 4.1 Growth in (US) online advertising has been expected to be substantial (Based on eMarketer, 2004, in Aris and Bughin, 2005:239, and IABEurope, 2007).

---

newspaper copies are purchased every day throughout the world (ibid.). And despite the decreasing number of sold print copies, profitability for newspaper companies, at least in the Nordic countries, is high (DN, 2007; NORDICOM, 2007). Thus, the newspaper industry is (still) a very powerful and profitable media industry.

[6] The term *young* is ambiguous in the referred-to literature. It can reach from age nine (e.g., NORDICOM, 2005.1) to less than 30 (e.g., Raeymaeckers, 2002; Wadbring, 2006), or specify consumers between 14-29 years of age (Hess, 2005:59), yet it could indicate consumers over 30.

In 2005 Bill Gates stated (Murdoch, 2005:53§) that the internet would attract $30 billion in advertising revenues annually during the next three years, which [almost] equals the entire advertising revenues currently generated by the newspaper industry as a whole in the US (ibid.). Though not yet there, internet advertising revenues totalled $17 billion in 2006 in the US, exceeding the previous year's revenues by 35% (IABEurope, 2007); see Figure 4.1. The growth is due to the ability for different markets to achieve both performance-based and branding objectives using interactive advertising (ibid.).

Even through online newspaper advertising is faster growing than is print newspaper advertising (NAA, 2005b; IABEurope, 2006), these revenues account for only 3-5% of the total advertising revenues of newspapers (NAA, 2005a:26), and despite its rapid growth, it will still take years provided this trend continues, before the online advertising revenues equal the advertising volume of print newspapers, according to the *State of the News Media* (SNM, 2006). And the print newspaper companies' fear of losing advertising money to media on the internet is being realized, particularly in the classifieds (e.g., Aris and Bughin, 2005; Murdoch, 2005). The advertising revenues are not staying in the newspaper market, but are migrating in particular to new entrants, such as niche actors in traditional media and ISPs (Aris and Bughin, 2005; Turpeinen, 2007).

Suggested reasons for the decline of print newspapers

Social changes such as the increasing mobility of consumers, the growing number of single-person households (Antoni, 2003), and the transition from seven-day subscription to occasional buyers (SNM, 2005) have altered the newspaper consumption pattern. Some companies have deliberately reduced unprofitable circulation, for example to outlying areas or businesses (Picard and Brody, 1997; SNM, 2005), and the decrease in circulation has generally been more severe for evening newspapers than for morning newspapers (NAA, 2005a:18; NMP, 2006:2; TU, 2006a:4). The increase in media selection has also changed the consumption patterns, and caused media use to become more fragmentized during the past decade. Technical developments have increased the use of mobile communication media devices and made this type of communication more efficient and convenient. A suggested key factor in the decline of print newspapers is the migration to other newspaper channels, especially among young readers (SNM, 2005), mainly to online and free newspapers, neither of which are generally included in newspaper circulation counts. Free newspapers are among the fastest growing newspapers in the world, and online newspaper consumption rose 200% between 2001 and 2005 (WAN, 2006: 52§). However, readership measurements of online news reading are less standardized, though the number of *unique visitors* is commonly used as measure. The difficulty with this measure is that it is not possible to know the exact number of visitors, as one person visiting a site from different places is counted as two persons, and computers used by many persons, for example in public areas, will appear as one visitor when there have actually been several. In some cases, this may indicate a greater change between old and new media than actually exists (Bergström, 2005a:61f).

4.1.4. New media, new opportunities

Although many media analysts and media executives have claimed that the internet is a threat to the traditional news media (Ahlers, 2006:29), others believe that the new development of delivery systems represents "the biggest change for publishing since the 15th century invention of movable type" (Ziegler, 1995:A1, in Weir, 1999:2§). Middleberg and Ross (1997, in Aikat, 1998:96) conclude that online technologies and the simply tremendous growth in online publishing in the mid-1990s, have changed the nature of news operations more than anything in the previous 40 years.

Why is this? For the producer, a streamlined, all-digital production process has several main advantages: no costs for printing, paper, and distribution. The cost of producing the first copy remains equal across analogue and digital media, but the digital newspaper has a near zero marginal cost for each additional copy, whereas print newspapers have a significant marginal cost for each additional copy (Shapiro and Varian, 1999). *Printing* is a primary cost, both the sensitive analogue process and the physical printing plants; a printing press is a large investment and the operational costs are not negligible. For example, the Los Angeles Times' $230 million press building turns 430 tons of newsprint and 700 gallons of ink into 600,000 newspapers every day (Picard and Brody, 1997). Raw materials, primarily *newsprint*, account for approximately 10% of the costs (Ahlers, 2006: 47: TU, 2006:7), and its volume affects the distribution costs. *Distribution* is a main concern, especially for countries with a high rate of subscribers, such as the Scandinavian countries, the Netherlands, and Estonia (De Bens and Østbye, 1997; Weibull, 2005:36). In Sweden, 93% of newspapers are sold as subscriptions (TU, 2006a:6). A positive effect is that subscriptions dominate sales in countries with high levels of readership (Weibull, 2005:37), but the distribution system has to function well in order generate loyalty to the newspaper. Especially for countries with large geographical areas, including the many sparsely populated areas of most of the Scandinavian countries, maintaining a well-developed distribution system is costly. Another opportunity with digital publishing is offering the same content through several output channels, with multiple channel publishing production, at little marginal cost. A further opportunity is time. With the print newspaper, the news is delivered the following day, whereas one of the main advantages of electronic media is the timeliness of distribution: freedom of arbitrary deadlines, deliveries several times a day, and instant updates in case of breaking news, areas in which the traditional newspaper has been at a disadvantage in relation to push media such as radio and television. Additionally, electronic delivery of news can add values without too much cost, hence additional revenues, by including features and services connected to a digital technology.

Newspaper industry strategies

The print channel

However, there are strong emotional and financial attachments to print. The newspaper concept is strongly associated with ink-on-paper, and many habits are connected to the paper medium. Many production workflows are based on the printed product, where

changes take time and are costly[7]. In addition, assets, such as printing presses, are large investments, and producers want to protect their investments for as long as they can (Fidler, 1997; Picard and Brody, 1997). Thus, efforts have been made by print producers to seek out new readers and secure the loyalty of old ones by changing to new and smaller formats and new layouts, by including special sections for both broad and narrow groups of readers, and by including additional supplements (Nilsson and Severinsson, 2001; Sternvik, 2005; NMP, 2006), as well as by maintaining journalistic competence, and furthermore by reducing costs for production and resources (NMP, 2006).

The digital newspaper channel(s)

Although most traditional news media have launched online sites, they have had different objectives for establishing them[7]. Initially, in the mid-1990s, there was a great deal of experimentation on content, access tariffs, etc., and many producers went online because others did (Bergström, 2006:3). At present, in 2007, newspaper companies are not among the very top of the most popular sites visited on the internet (Alexa, 2007). Among traditional media companies, BBC and CNN are the top-ranked sites, ranked as around number 40 in terms of global visits. The most visited traditional newspaper company, *The New York Times*, appears at number 160, yet most newspaper companies have ratings past 500 of the most visited sites. (ibid.) Thus, electronic publishing channels, even the well-established online channel, are still considered uncertain investments, although the companies' main intentions are hardly to gain global reach, or regard their products as exclusively digital, compared to other ISP businesses and services such as search engines, communities, and games. Large investments have been made without sustainable business models, and in expensive online acquisitions that have failed (Aris and Bughin, 2005). Still, newspaper content is commonly given away for free online, and compared to ISPs, such as those of *Google*, *Yahoo*, and MSN, most newspaper companies have not found successful business models. Yet the online channel is slowly becoming profitable (Hedman, 2004; Borrell, 2007). Much like newspapers started radio stations in the 1930s and radio stations started television stations in the 1950s, traditional media owners are trying to anticipate how to best capitalize on the digital environment (Mings and White, 1997; Alves, 2001; Conway 2001; Chan and Leung, 2005:358f), so as to attract new newsreaders.

In general

Thus, newspaper companies continue to experiment with emerging media, by building on their trusted relationship with their customers, adding value, and launching new formats (Aris and Bughin, 2005), and especially by increasing their appeal to younger consumers (Murdoch, 2005; WAN, 2007). The main appreciable strategy of media organizations, starting with the digitalization, is economical convergence – consolidation through acquisitions, mergers, and strategic alliances, both horizontally[8], but more often vertically, expanding their presence through the value chain, and diagonally, for example convergence of telecom and media industries, and in cross-media sectors (Andersen, 1999; McChesney, 2000; Aris and Bughin, 2005). A global trend is media oligopoly (larger but fewer companies), with diverging media output channels and converging content

[7] Described further in Paper III-IV.
[8] A firm's attempt to control as much as possible in a particular media field.

(Andersen, 1999; Lundberg, 2004). However, consolidations or cross-sector synergies are less common in Europe than in the US (Aris and Bughin, 2005). For most of the 20th century, newspaper companies were family businesses, run for the long term and attending to market shares more than profitability (Meyer, 2004). The tendency in Europe is that the family-owned media companies are expanding into multiple sectors, although the main source of revenue tends to be in one or two sectors, and growing internationally to compensate for the often small size of their home markets (Aris and Bughin, 2005). In Scandinavia, large media players are *SanomaWSOY* (Finland), *Bonnier* (Sweden), *Schibsted SCA* (Norway), and *Egmont* (Denmark) (Sundin, 2006); these are exemplified by the organization of *SanomaWSOY* in Figure 4.2. Although all organizations have been interested in investing in emerging media, they have had different strategies. Whereas, for example, *Bonnier* and *Schibsted* have primarily focused on establishment in their core businesses in the Nordic market, *SanomaWSOY* has concentrated on other sectors, with a great international focus (Sundin, 2006).

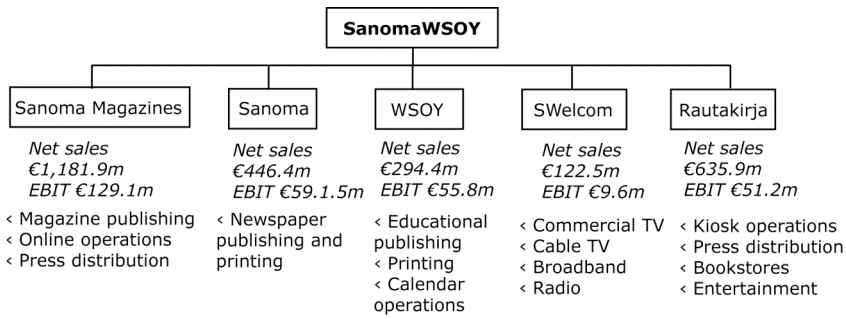


Figure 4.2 Organizational structure at *SanomaWSOY*, one of Europe's top 20 media groups, and the largest group in the Nordic region, showing its cross-media sectors (Aris and Bughin, 2005).

Furthermore, markets traditionally dominated by regulated public service media are now subject to competition from commercial alternatives (Sundin, 2006).

4.2. The consumer perspective

In the present work, the persons using the newspaper media are called *readers*, *consumers*, *audience*, or *users*, depending on the situation discussed. Moreover, there is not a one-size-fits-all pattern of news consumption. Instead there is a broad range of news consumption behaviours.

4.2.1. Consumption patterns

The average adult Swedish person spends around six hours a day using media, a time period that has only slightly (by 20 minutes) increased during the past 25 years (NORDICOM, 2005.1), however, it increased further, by 17 minutes, between 2004 and 2006 (NORDICOM, 2007.1). As the amount of time available for media use is limited, the introduction of a new medium might result in a corresponding reduction in the time spent

on other media activities (Chan and Leung, 2005:363); described in Chapter 3. Thus, as more media technologies have been introduced onto the market, media consumption has become more *fragmented* during the past 25 years (Bergström, 2006; Cepiate, 2006). Additionally, media use is becoming more *individualized* (e.g., Hadenius and Weibull, 1999; Bergström, 2006). With analogue media, consumers have been tied to the pattern that has existed in the publishing and broadcasting flows. With digital media, consumers can choose their own content according to their schedule. This increases their independence and individualization with regard to what to consume, but it also places demands on consumers, who must actively find the content that is important (Hadenius and Weibull, 1999).

Media can satisfy various needs and serve different purposes, where several factors are at play, and compete for the user's attention. One is the need for information, to be updated about events. In this case, different media can serve different purposes for one person during different times of the day. Development of new media technology increases this possibility. For example, for the consumer, electronic distribution makes the reception unbounded in terms of reception device and location; the news can be delivered on the end-user's terms, as mentioned. Time of use is another important factor. For example, a morning newspaper and the internet are used for the same amount of time, approximately, however, the internet is used for many tasks other than reading (Bergström, 2005b). Another factor is the different ways of using different media. It has been claimed that simultaneous media consumption is not common (ibid.:219), instead different media platforms are used during different periods of the day, largely based on the purpose they serve and their contents (Hadenius and Weibull, 1999). Other studies have found that simultaneous media consumption is common (Alperstein, 2005; Pilotta and Schultz, 2005; Appelgren, 2007), although the consumption depends on the medium: reading a newspaper or watching a DVD film is mainly a primary activity, whereas watching television, using a phone or a computer, is to a higher extent a secondary activity (Bergström, 2005b; Appelgren, 2007). Moreover, independent of the medium, users have specific media consumption patterns. Those who are heavy users of one medium are also likely to use other mass media fairly regularly; people who make light use of mass communication are likely to be restrictive with all other media (Right, 1986: 144, in Nguyen and Western, 2006:7; Chan and Leung, 2003:377; Ahlers, 2006:36). Schwiger (2005, in Bergström, 2005b:220) shows that skim readers skim both print and online newspapers, and habitual users have fixed times for using a specific medium; moreover, a person who spontaneously decides on media use commonly does so for all media.

Habits

Hadenius and Weibull (1999) claim that media consumption is closely contextualized within certain times and places throughout everyday life. Newspaper reading has traditionally been closely related to morning habits; the print morning newspaper is commonly read during breakfast and during commuting to and from work (NORDICOM, 2005.1; Cepiate, 2006:58), television is watched in the evening, and phones are used at all times during the day (Westlund, 2006). Newer media do not yet have the same connection to daily life routines (Hadenius and Weibull, 1999), but as internet use is becoming well established, internet news utilization is commonly connected to workplaces and schools (Nilsson, 2005:113), from lunch time and onwards (NORDICOM, 2005.2). Free newspapers

generally seem to serve the same purpose for readers as the morning newspapers do, however they are not included in the traditional morning habits as they are not distributed to the door (Bergström and Wadbring, 2005:14); they are mainly read while commuting (Wadbring, 2003).

Although the media market and the amount of available content in different media have increased enormously during recent decades, consumption habits have not changed to the same extent (Bergström, 2006). For new media channels to succeed, they must offer appealing benefits to their audience in several of the competing aspects of time, utilization and technology. For example, the free newspaper is a media channel that during a relatively short period of time has achieved great success on the media market because it is free and convenient, and has found a niche in users' daily life, i.e., users did not have to change their basic habits and routines to read the new channel, the free newspaper became a new routine within an existing habit; during commuting (Wadbring, 2003). News reading in mobile phones, however, shows the opposite pattern. Although more that nine of ten persons in the Swedish population (between 9-79) had access to a mobile phone in 2006 (NORDICOM, 2007.1:116), less than ten percent used it for news(paper) consumption, and such use is rather infrequent (Westlund, 2006).

It takes a long time before media become domesticated (Hadenius and Weibull, 1999:452), primarily because it is convenient, cognitively undemanding, to follow a routine (Nilsson, 2005:122). A long series of positive experiences will result in the development of media habits (Westlund, 2006), often formed when consumers are young (James, 1998, in Westlund, 2006:11; Meyer, 2004). As digital media are far from developed and diffused (Aris and Bughin, 2005), it is difficult to predict how consumers born and bred with digital technologies – consumers who do not yet have the same established media habits and routines as older consumers do – will make use of new media in the future, what their future habits will look like (Bergström and Wadbring, 2005:15).

4.2.2. Factors that affect the use of newspapers

Resources, integration, and stability are factors that influence the use of newspapers and time of reading. Basic conditions include gender, age, health, education, work, income, family conditions, and social engagement, values, and interests, all of which are part of the lifestyle into which people's media habits fit, where age is one of the most important factors (Andersson, 2005:130; Nilsson, 2005:141). Readership habits develop over time, but what is read on a particular day is determined both by habits and by the specific situations at the time (Dagspresskollegiet, 2007).

Age and gender

For traditional news channels, use increases with age, however this is less prominent for newspaper use than for television and radio use (Bergström, 2006). The audience reach for daily (print) newspapers on weekdays in 2005 in Sweden was 74%, 83%, 91%, and 94%, for the age groups 15-29, 30-44, 45-59, and 60-79, respectively. Online news consumption shows somewhat different patterns. The audience reach for the online edition of the

largest[9] (print and online) newspaper in Sweden was 46%, 43%, 32% and 11% for the same age groups, respectively (TU, 2006a:15). For all the other major newspaper companies' online editions, the audience reach was largest in the age group 30-44 (ibid.). Consumers in the age range 18-34 are increasingly using the WWW as their medium of choice for news consumption (Brown, n.d., in Murdoch, 2005:13§). The shares for online reading have increased every year over the past eight years, and online news is well established among the Swedish population, although compared to other news media use, online newspaper reading is still quite small, as exemplified in Figure 4.3 (Bergström, 2006). Altogether, 25% of the adult Swedish population visits news sites frequently (i.e., three days a week or more) (ibid.). As regards free newspapers, the age group 15-29 was reached to a somewhat greater degree than were the other age groups. Daily newspapers and free newspapers are read somewhat more (1-2%) by women than by men in Sweden (TU, 2006a:12ff). Online newspapers are read to a higher extent by men (8%) in Sweden (ibid.:16), and by women (11%) in the US (NAA, 2005a:30).

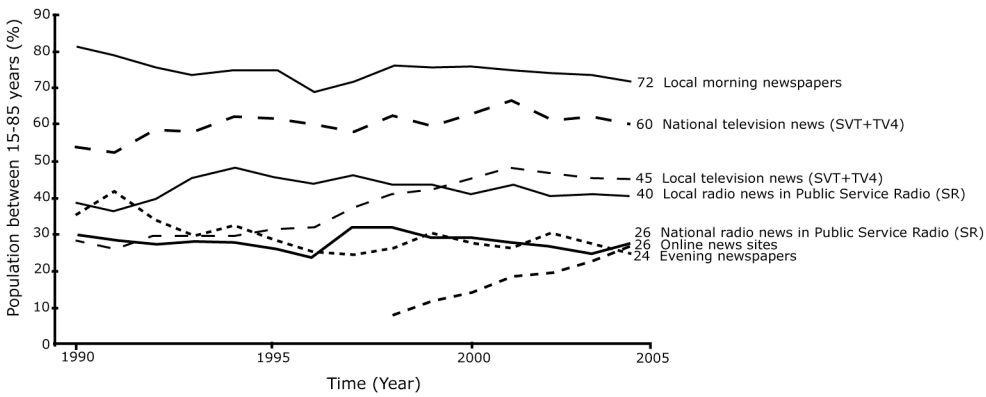


Figure 4.3 Frequent use of different news media in Sweden, 1990-2004. *Frequent* here means at least five days a week, except for evening newspapers and online news where at least three days a week is the criterion for frequent use. (Based on a national SOM-survey 1990-2004, in Bergström, 2006:9).

Time

Print newspapers are read approximately 30 minutes a day by the average adult Swedish person (somewhat longer for morning, than evening newspapers) (TU, 2006a:10). Roughly speaking, the average user spends 30 minutes a month on the internet newspaper, according to Crosbie (2004, in Bergström, 2005b:220), and 37 minutes according to NAA (2005a:30). Cole (2004, in Ahlers, 2006:38) states that *new* users (internet use less than a year) spend an average of nine minutes per week reading online newspapers (consistent with the data above), however that very *experienced* internet users (internet use six or more years) spend 48 minutes per week reading online newspapers. This is an important indicator of the formation of new habits.

[9] The evening newspaper *Aftonbladet*.

New internet users read print newspapers on average four hours per week, whereas experienced online users spend an average of three hours per week, reading print newspapers (Cole 2004, in Ahlers, 2006:38). These data suggest a decline in print readership and an increase in electronic readership as users become more acclimated to the online world, but do not indicate a wholesale migration from the print medium to the online medium (Ahlers, 2006:38). However, results on this matter have been contradictory, as shown in Chapter 3.

Availability

Internet access is the most important factor dividing internet news users from other users, as persons with access at home are most likely to become users (Westlund, 2006). Active broadband users spend up to 25% less time reading print newspapers than do people without online access (Aris and Bughin, 2005:230); NORDICOM (2005.2:32) claims half that figure, and others show the opposite relationship; see Chapter 3.

As younger people's reading habits are of great concern, Raeymaeckers (2002:381) has shown that if younger people have regular access to newspapers at home, they more readily develop personal reading habits and spend more time reading the (print) newspaper.

Markets

Reading habits do not show a clear pattern that is similar across different countries and markets; positive as well as negative tendencies can be observed. However, differences can be observed. In northern Europe, newspaper readership and circulation are much higher than in southern Europe (Weibull, 2005; Bergström, 2006:1). For example, almost 90% of the Swedish adult population reads a newspaper on a daily basis, compared to, for instance, Portugal or Italy, where less than 40% are frequent readers (Hallin and Mancini, 2004, in Bergström, 2006:2). It is difficult to say what causes these differences, but several aspects differ between the markets (Hallin and Mancini, 2004:89ff, in Bergström, 2006:2; Weibull, 2005). In the Nordic countries, newspapers have had a long democratic tradition and political stability, both of which have increased reliance on the media (Weibull, 2005:31). The northern European markets are also more differentiated; newspapers with different content-profiles are distributed in different geographical areas: local, regional and national. All newspapers, with the exception of a few evening newspapers, are published in the morning, and most are sold as subscriptions with early morning home delivery. The strong newspaper market leads to a strong advertising market, which in turn strengthens editorial developments and improvements in service level. In countries with high circulation, reading habits are more widely spread, and differ less between different groups in society, compared to countries where readership is lower. Also, newspaper consumption differs within markets. For example, two countries of the Nordic countries, Finland and Norway, show more than double the newspaper readership time compared to Denmark (Van Weezel, 2006:8). And in the Swedish market, habits of reading morning newspapers are stronger in smaller (local) demographic areas (Cepiate, 2006:61) than in cosmopolitan areas, where local areas have a smaller decline in newspaper circulation (NMP, 2006).

4.2.3. Consumption of news

The present media range offers great freedom of choice for each individual user's wishes with regard to both content and format, thus the changing media environment offers new perspectives on what newspaper reading means (Sternvik *et al*., 2005:73). The audience's navigational ability is put to the test in an increasingly complex media range, but media audiences have developed considerable skill in organizing, filtering, and skimming information (Neuman, 1991). Here, *reading behaviour* is defined as the process by which the user interacts with factors that influence and affect the partaking in information, such as presentation, news content, medium interface; this process includes both strategic and non-strategic behaviour. Reading theory and reading behaviour are further described in Papers V and VI. The typical news consumer is not passive, but is somewhere in the middle on a continuum from passive to active (Turpeinen, 2003), consciously or subconsciously, before, during and after their media exposure (Nguyen and Western, 2006:5). The user's behaviour is voluntary, and individuals actively scan, select, and interpret the flow of information that comes their way (Turpeinen, 2003), but the distinction between seeking and needing information, and actively scanning and being entertained, is blurred (Neuman, 1991). As mentioned, consumers generally select media channels and content that suit their situation, which encompasses a choice based not only on available resources and the medium's technological attributes, but also on consumers' desires, their social origin, gender, past media experience, the socio-cultural settings of use, and the availability of content (Graber, 1988; Weibull, 1995b, in Sternvik *et al*., 2005:83; Weir, 1999; Turpeinen, 2000; Dutta-Bergman, 2004; McQuail, 2005; Nguyen and Western, 2006). Reading newspapers and watching television are associated with relaxation and amusement (Turpeinen, 2000:26), and media users generally have a positive attitude towards the qualities that characterize digital media, such as online newspapers (Cepiate, 2006:93).

User interface

User interface is a technological term, referring to the junction between a medium and the user, allowing both input and output, and is very important to mass communication (Pavlik and McIntosh, 2004). There are two aspects to a user interface. One is the development of technology, the other is the social aspect, getting users to use the technology (ibid.). Traditional media interfaces offer efficiency as they have had a long history of development, and are relatively simple and static, with few possibilities of interaction. Digital media, on the other hand, because of their relatively newness and complexity, are challenging from a usability perspective (Pavlik and McIntosh, 2004): (1) digital media have not had time to optimize their efficiency of utilization, (2) rapid advances and increasing technology innovations changes the interface preconditions, e.g., content in a cell phone may appear very different to one of a wall-sized screen, (3) varying computer standards mean not all technology is accepted at all devices and platforms, and (4) the media audience often remains media illiterate from a technological standpoint, much due to the producers' equal novel knowledge in how to present content in a user-friendly way. Most of these problems sort themselves out over time, however, and become less of an issue compared to traditional media, but is likely to take some time (ibid.).

To be practical, the user interface should be intuitive and natural, yet appropriate to the medium and its content and customized to each user's preferences (Pavlik and McIntosh, 2004). Newspapers have evolved as an efficient mechanism for presenting a large range of loosely related information to the reader (Golovchinsky and Chignell, 1997). The *newspaper metaphor*[10] is well established, whereas computer-based text retrieval systems have 'traditionally' given the reader a list of titles or keywords in context and letting the reader read through the articles one at a time (ibid.), but include other benefits, see below.

Before the development of the computer, the term "user interface" was generally not employed in the discussion of the media (Pavlik and McIntosh, 2004). This is because the traditional, analogue media were not designed to be interactive, and what is called user interface was relatively unchanging (ibid.). In the present work the term *presentation-style* is used representing user interfaces of both analogue and digital media, where the main focus is on the presentation factors. Presentation factors in newspaper media include local design factors (images, headlines, drop quotes, fact boxes, etc., and in digital media also such as links, and interactive and dynamic features) and global design factors (interface, format, typography, page layout, etc.), whereby size, placement, and colour can be both local and global. This is described further in Papers V and VI.

Distinguishing characteristics

Digital news media distinguish themselves from traditional media in a number of ways: they are interactive; they offer convenience in the form of easy access, searchable features and the ability to cross-reference through hyperlinking, drop down menus, and pop-ups, using multiple windows, and in a combination of graphics, animation and other multimedia (Pavlik and and McIntosh, 2004; Chan and Leung, 2005). The user can interact with the producer immediately, interact with digital content and services, and interaction means that anyone can be a news provider, for example through the use of weblogs (e.g., Bergström, 2006, Chinni, 2006). Although consumers have been relatively active information seekers also in traditional media, but owing to digital media they are becoming increasingly active. Hyperlinks change the newspaper from a single source of information to the hub of an information network, which allows readers to go beyond daily news to other information sites and makes newspaper reading non-linear (Lee and Soo, 2000, in Chan and Leung, 2005:363). Multimedia has always been touted as a key feature of digital media. Presenting information with text, animated graphics, video and sound, multimedia generally entails a rich sensory interface between humans and computers or computer-like devices, an interface that in most cases gives the user control over the pace and sequencing of the information (Flynn and Tetzlaff, 1998, in Chan and Leung, 2005:362). Print on the other hand, offers other advantages, such as: always being portable, robust, having a large format, being cheap, and allowing easy overview, providing visual and tactile feedback, and being reflective rather than emissive. Print newspapers never run out of batteries (Little, 1996:75), they are always "on", independent of well-functioning telecommunication networks and power.

[10] For further description see Paper V.

CHAPTER 5

SCIENTIFIC CONTRIBUTION

5.1. Summary of major findings

5.1.1. Papers I and II

High-end monitors, based on both CRT and LCD technologies, often perform well by default, sufficiently for many applications, but when monitors are to accomplish certain requirements, such as those set by standard values, the demands require the monitor to work consistently. The present high-end LCD technology is in many ways superior, or equal to, an equivalent CRT monitor with respect to colour reproduction. For example, LCDs have a larger gamut and contrast range, and they are sharper and flicker free (Apple, 2003), and should exhibit better spatial independence and equal uniformity, compared to CRT monitors. Colour shifts, depending on viewing cone, have been one of the main evident obstacles during work with LCDs, but the evaluated LCDs showed reasonable colour shifts within normal viewing angels.

One problem with LCDs, and most likely with monitors in general, is the difficulty in calibrating correctly without hardware calibration, which is available in only a few monitors. Other obstacles are the convergence of the primary chromaticities at lower digital input levels, the non-proportional characteristics of the primaries, the differently shaped electro-optical curves, and the channel interaction. Moreover, display characteristics are not always on a par with manufacturers' claims regarding, for example, time to stabilize during warm-up, level of uniformity, and the possibility to obtain correct calibration. These disparities introduce one of the main problems with LCD colour management: the variations in fundamental characteristics due to different structural design between displays of different brands, but also between models from the same manufacturer. Colour management equipment is not designed to account for these varying characteristics. High-end LCDs, for example, have very modest physical change in the primary chromaticity coordinates, whereas notebook LCDs, for example, are highly influenced by leakage of light, especially originating from the blue channel, thus inducing several limitations to consistent colour reproduction. In the present work, however, the deviation of the blue channel is slightly more affected at low digital input levels, on a par with previous studies, but after black correction, the red channel is most affected for one LCD, although the chromaticities are nearly constant for all channels of the evaluated LCDs.

LCDs are sufficient for colour work, if consideration is given to variations in performance between displays of different manufacturers and models. Nevertheless, as with CRT displays, careful consideration must be given when choosing a display, depending on application, and the user has to be aware of occasional divergences from the specifications

asserted by the manufacturers. However, some characteristics cannot be controlled, and the user must learn by experience how a specific display varies in accordance with other output devices. The quality of LCD displays is increasing, as is their rate of diffusion. One indication of this is that Barco, the main manufacturer of CRT displays used for colour-critical work, no longer manufactures CRT monitors (Barco, n.d.).

5.1.2. Paper III-IV

The success of an e-paper newspaper will depend on several related aspects. First, it would seem wise not to release an e-paper edition before the technology has been suitably developed. Second, it is important to have a target audience for the initial e-paper edition decided upon, though as yet this matter seems to have gone unconsidered. These two aspects determine the design of the content, and the production of the product. A potential newspaper channel such as e-paper could be produced in several ways, suggested here as five workflow models: a replica of the print edition, a replica of the online edition, a unique edition, produced on the fly, or possibly the most optimized production, as a part of a multiple channel publishing workflow. All production models have their upsides and downsides, largely depending on the companies' present production organization, company size, and available resources. The third aspect concerns timing: whether the e-paper product is going to be suited to consumers' media habits, lifestyles, and identities. The rate of adoption, however, ultimately depends on the advantages for the consumer: convenience, availability, and usability, the number of added values, and observability, in relation to cost and complexity. Still, the print newspaper exhibits most of these characteristics, and/or is most integrated into consumers' habits and routines. Nevertheless, online newspapers are paving the way for electronic newspapers with regard to presentation styles, consumer habits, and reading behaviour. But if the newspaper companies' vision materializes, the e-paper news product will be inexpensive, interactive and dynamic, include many value-added features, and have a newspaper-like layout – totally different from, or, a replica of, the print newspaper.

Although e-paper's expected competitor is print, if the e-paper is technologically immature in the market penetration stage, and the news product replicates the printed edition, this might increase competition between the potential e-paper product and the online newspaper, as they target the same consumers. In this state and stage, e-paper would have a greater chance of succeeding if it were to provide more value-added services besides its physical difference from the other media, that is, if it were produced so as to include unique values. A replica of the print edition could, however, be an affordable way of initiating a new, rather uncertain product for smaller newspaper companies, whereas a larger company could initiate a unique product, exploiting from the outset the advantage of the new digital medium, making it market relevant, and paving the way for smaller companies, in addition gaining a first-mover advantage. When the technology is developed, that is, when the diffusion can be pushed more by the technological benefits, the competition with the print newspaper medium will probably be more severe, as the media then will exhibit similar characteristics, in addition to the e-paper's digital qualities. Online newspapers, on the other hand, always have the advantage of being only one of the internet's many functions.

Future newspaper publishing will most probably include multiple channels, in addition to the expected appearance of new technological media innovations. Because most newspaper workflows at present do not consist of such a structure, an opportune push towards such workflows will arise if or when an e-paper channel is implemented. Depending on the development of e-paper technologies, and the time the companies spend on suitable strategies, there could be a long period of parallel publishing of paper and e-paper editions, which will be costly.

5.1.3. Papers V and VI

When a new media channel appears, which is often equal to the appearance of a new technology, it passes through an "identity crisis", caused by an ambiguous feeling regarding how to relate to already established media. For the online newspaper, this means that during the decade it has been present on the media market, its presentation has transformed from hierarchically structured, with few images and prominence cues, to a metaphor with characteristics similar to those of the traditional newspaper, although used in a less standardized way. Not all of the layout cues of the traditional metaphor can be figuratively applied to the structures of the electronic newspaper, but many can provide a familiar paradigm and improve the effectiveness of the interaction. Yet it is not possible to get the same spatial overview of the content and volume of an electronic newspaper compared to print. It is harder to know if everything has been read, and there is no "natural" way through an online newspaper. Nevertheless, many users consider the overview of online newspapers to be satisfactory, and seem to have adapted to how information is placed online, directly or indirectly.

Reading behaviour is largely a learned skill, and higher familiarity with the interface will aid broader acceptance of the exploration paradigm of electronic information. Furthermore, reading behaviour itself does not greatly depend on media, that is, the notion that reading on paper is done passively and reading on the screen is done actively is slightly exaggerated. There seems to be a gradual difference, instead of a categorical difference. For example, the reader of a print newspaper is not bound to passively read everything in a newspaper, as a matter of fact, very little of the content is actually read independent of media. In addition, the editor of an online newspaper has a considerable opportunity to influence the reader with regard to what to read, contrary to what is commonly claimed, in large part due to the front page's importance as a prominence hub, as readers continuously return to the front page after reading an article to find new information. What differs from traditional newspaper media is that the editors of the online newspaper have fewer options for getting readers interested in 'news they did not know they wanted to read'. Hence, for the user, the major difference between old and new media is greater choice and control. This means that the amount of time spent on viewing information depends to an even greater extent on the news' salience and/or relevance given a specific search goal.

The behaviour that does depend on media, is that consumers read just a few articles in the online newspaper, are more meticulous concerning what to read, and read the newspaper for a shorter time, compared to readers of the traditional newspaper. On the other hand, readers of online articles read more in-depth, and the newspaper is commonly read several times a day. A consequence of this is that the reader scans more while reading an online

newspaper, compared to a printed newspaper. Thus, reading print newspapers is characterized by a wide topic spectrum and shallower reading, whereas online newspaper reading is characterized by a narrow topic spectrum and deeper reading. There are two ways to look at this: if less search time and more reading are considered efficient, then print newspapers are a more efficient reading medium than are electronic papers; however, if specific topic selection and in-depth reading are considered efficient, then the online newspaper is a more efficient reading medium for news. A concluding assumption would be that print and online newspapers at present function as complements to each other. The most popular electronic newspaper media, the online newspaper, provide for updates and specific topics, whereas traditional newspapers are used for longer reading sessions at offline locations. New electronic media will probably not serve as complements, but may intrude on already established newspaper media's consumer base.

5.1.4. Paper VII

Users have further adopted the architecture of hyperstructure and navigation in digital environment, a tendency also observed in Papers V and VI. The participants, on the whole, actually read the online newspaper for a longer time compared to the printed counterpart, and compared to results from previous studies generally visited more pages and were more hedonistic in their behaviour. However, in accordance with previous results, the participants were generally quite goal oriented when reading on the secondary page level and the articles were read in great depth. Thus, the participants used online reading behaviour, but less consistent. This further adaptation to a digital environment may be due partly to the fact that efficient navigation in complex documents is largely a learned skill, and partly to producers' developments of online newspaper presentations. As an e-paper includes qualities from both print and computer media, reading behaviour patterns on e-paper is suggested in Paper VI to possibly be a mixture of those observed for these media. While reading the e-paper news product on the e-paper device, the participants used online reading behaviour from the beginning; they were goal oriented and used the links for navigation, while after reading the information they found immediately interesting, they began using the pager for navigation, started to scan more, and read the articles more shallowly; all participants used a mix of pager, links, and lists for navigation throughout the session, thus practicing both linear and hyperstructural reading behaviour.

Digital added values, such as multimedia and interactive services, were not used to any considerable extent in the online newspaper. Thus, online presentations may not yet have acquired full technological sophistication and/or the users have not yet fully adopted digital behaviour, a reason may due to the fact that consumers (and producers) consider, and use, the newspaper as a static medium, that is, a newspaper is to a great extent still regarded in its traditional meaning. However, although not utilized, digital features and services were considered to be one of the main advantages of the online newspaper compared to its printed counterpart, along with the possibility of regular updates and rapid access to a large number of news sources, and moreover, that online newspapers are normally provided free of charge. One main disadvantage of the online newspaper is its relatively low level of mobility, according to the participants: newsprint can basically be read in any place and at any time, it is convenient and comfortable. This is why print newspapers are still considered to be the primary newspaper medium here, whereas online

newspapers are highly valued as a complement to print. Accordingly, the participants felt they might prefer an e-paper newspaper during transportation, or if no internet connection were available, if or when, an e-paper news product will become available on the market. Generally, reading a newspaper on an e-paper device received mixed reviews, where the most negative opinions were related to the inability to adopt the new presentation structure, and the most positive that the e-paper was more logically structured and easier to overview than the online counterpart, and had a more convenient format than print. Smaller newspaper formats were generally preferred – from the tabloid format of the print newspaper – to the A5 format or preferably A4, of the e-paper. But, according to the participants, the e-paper requires further technological development: increased contrast, faster updating of pages, and increased presentation and navigation interface. For now, a regular computer was considered the superior digital reading medium.

The ease or difficulty of consuming content varies from newspaper to newspaper, particularly online where presentation styles are less standardized than in print, and especially for e-paper, which is still in the prototype stage. Because digital media technology is still developing, online newspaper consumption patterns are changing, and the introduction of additional newspaper media also affect the behaviour patterns associated with print newspaper utilization. Thus, the digital newspaper is slowly starting to develop and transform into something that further utilizes its own qualities – but how, and what is still at the initial stage – the newspaper concept is still at large physically and mentally connected to consumers' idea of the traditional concept of a newspaper.

5.2. Discussion

5.2.1. The definition of new in new media

The impact of new digital media and their meanings depends on what a new medium constitutes, a complex matter that is rather difficult to comprehend. As shown in Chapter 3, many theorists believe a new medium is always based on an old medium; either through adaptation into functional differentiation, or by convergence to functional multiplicity[1]; the purpose is either improvement of a feature for the sake of the medium's original purpose, or improvements by a new function. Does this mean that new media are never entirely new? After a certain amount of time, a new medium may have evolved into something so completely different from its ancestor(s) and/or original purpose, that it can no longer be connected to it. It is questionable whether it can still be regarded as new by then, or whether it has possibly evolved further into another new medium. Accordingly, entirely new media are very uncommon.

Evolutionary theory is often used as an allegory for interpretations of developments of media[2], an approach that appears to be useful. According to Stöber (2004), both evolutionary processes have irregular lifecycles – the speed of evolution sometimes

[1] See Section 3.2.3.

[2] E.g., Dimmick, J. and Eric Rothenbuhler, 1984; Fidler, 1997; Dimmick, 1997, 2003; Lehman-Wilzig and Cohen-Avigdor, 2004; Stöber, 2004.

proceeds faster, sometimes with reduced speed, and sometimes it stops completely. They are both historical processes – they cannot be foreseen, however clear they seem in retrospect. Both evolutionary processes have produced a great diversity of species and media. And in both cases, evolution changes the environment – species change their habitat and media change society. But there are important differences: bio-evolution does not follow a grand plan or intention – individuals do not pass on predetermined attributes, which is quite common with media, and reproduction includes intercourse and fertile offspring, where media lacks a comparable criterion. Clearly, media evolution does not always follow a grand plan either, but the direction and speed of development can be, more or less, planned.

In both fields, creation of diversity is due to competition, such that survival in bio-evolution is possible in two ways, according to Darwin (1859): The group that is best modified and improved to suit its environment will eliminate and replace not only their own original forms, but also closely related forms, as will a superior group that invades another group's niche. However, if the old forms are, or become, niched by specialization of either specific factors or environments, they might escape extinction. If these ideas are applied to media evolution, often no completely new media appear, and no media are completely excluded conceptually, though old media per se do eventually disappear. In the history of biological evolution, only a small fraction of the species that have ever lived are presently in existence (Curtis and Barnes, 1994), however an extinction process that spans over a very long timeframe, where the extinction of a whole group is generally a much slower process than the process of the same group's coming into existence (Darwin, 1859).

Concerning propositions about new media diffusion, such as the 30-year rule, innovation of diffusion and the product life cycle, their validity is dependent on the flexibility of defining when new media are regarded as new, when a medium has diffused to a stage that can be regarded as successful, and what actually defines a medium, each demonstrated in the following examples: If every new medium encloses older media, what is new depends on the degree to which the stages preceding the invention are accounted for. The iPod, a portable media player launched by *Apple Inc.* in 2001, is an example of a device that has rapidly gained popularity. Besides building on several old media, the reason for its rapid diffusion rate has probably much to do with the fact that it was launched by *Apple*, a company that has been around for more than three decades (e.g., Linzmayer, 2004), and with an extensive rage of previous media products, including brand, design, and marketing. In terms of when a medium is successful, the 30-year rule would quite accurately predict the development of e-paper if the device at present could be considered as successful, which the commercialized devices hardly can. Success could be defined as when the product cycle is well into the growth stage, reaching past the critical mass. According to this definition, the WWW could be regarded as successful, though maybe not as a medium? The 30-year rule is roughly supported if the internet is regarded as a meta-/multi-medium. However, the main success of the internet is connected with the advent of the WWW, which was introduced around 1990. If the WWW is seen as an independent medium, then the 30-year rule is not accurate. But is the WWW a medium, or should it mainly be considered a sub-network, a way of accessing and distributing information over the medium of the internet, like other applications such as e-mail and file transfer protocol (FTP)? Who and what decides what a medium is?

This question is very difficult to comprehend[3], since the meaning lies in the assumption of its normality – that everyone knows what a medium is – a meaning not strictly defined nor stabilized (cf. Cox and Van De Walle, 2004), but obviously depending on person and situation. Thus, to answer the above question is possibly not meaningful; the terminology might also be too fixed for new media technologies and their messages, although the lack of a conceptual framework is frustrating. The word medium is connected to an output device, the content that is presented, and how it is presented. Content can never stand alone, as opposed to a physical output device. On the other hand, without content the device is useless. Content and presentation together can be outputted on different media, while still maintaining an initial media concept, associated with another output medium, at least for now. Nevertheless, the definitions of specific media concepts, such as traditional mass media, are getting more transparent and blurred, and exploration of the message is becoming increasingly independent of what the fixed message assumed, and the original intention of the sender (cf. Jensen, 1998). New media are causing a paradigm shift, where traditional media concepts are being transformed into new, more interconnected forms, by cultural/visual convergence, for example on the internet where specific concepts are gradually disappearing. Yet, not all new media are multi- or meta-media, but some also appear in specific media forms, such as the aforementioned iPod. Thus, as such, the concept of new media is not a result of change, but a driver of change (cf. Cox and Van De Walle, 2004).

5.2.2. Evolution of the newspaper concept

Digital newspapers are not exact replicas of the traditional newspaper, and cannot be, due to the different modalities of the media, modalities that also vary for each digital newspaper depending on the characteristics of the media technology. The transformation of print newspapers to digital is inevitable more than transparent[4], however largely maintaining multiplicity by resembling the traditional newspaper metaphor, thus this transformation could be regarded as a dynamically continuous innovation, though internet per se is a discontinuous innovation. The envisioned e-paper product, especially one replicating the print edition, could be an even more transparent transformation of the print newspaper than is the online newspaper, as the device – when developed – will also resemble the characteristics of paper. Thus, a digital newspaper is conceptually defined by the content and presentation of the traditional newspaper concept, but specifically, or individually, defined by the characteristics of the digital medium it is reproduced on.

The newspaper metaphor is often believed to have been directly copied on to the WWW, "mirroring" the same "look" as the traditional newspaper (e.g., Lehman-Wilzig and Cohen-Avigdor, 2004), while adding some new interactive elements to fit the new medium, but still keeping the original format basically intact. This is true in the sense that early online newspapers were typically text-based and relied on content from the core product (e.g., Spyridou and Veglis, 2006). But since 1995, there has been a continuing development from the 'newer' format of common web page architecture – hierarchical

[3] Cf., for example definitions of medium by McLuhan (1964), Fidler (1997), Jensen (1998), Bolter and Grusin (2000).
[4] See Section 3.2.3.

structure, few images, text elements of similar sizes arranged in lists – to the 'older' structure of the newspaper metaphor – columns (or frames), more images, and more ('traditional newspaper') cues. It might not feel like fast development, but in relation to the medium's relatively short lifecycle, and the discontinuous innovativeness of the digital environment, it is a satisfactory development.

Digital news publishing is commonly termed *electronic delivery*. In line with this term, what separates print from the online newspaper is the delivery, apart from that, the traditional concept would be intact. Thus, at present, the online newspaper is largely understood through the concept of the print newspaper (cf. Bergström, 2005b; Falkenberg, 2006), and at this point in time, in the 2000s, perhaps it should be: why not utilize a well-known concept and what it involves to accustom consumers and producers to a new medium, boosting the medium's diffusion to further stages? However, while something known makes the transformation to something new easier, the status quo also puts constraints on development. Media producers have trouble freeing themselves from old media paradigms, in this case the characteristics of the print medium, which is not so surprising when new media include old forms. Using a metaphor developed for another medium, with different preconditions, constrains use of the new medium's particular characteristics, holding back development of the new concept, although not the initial diffusion. As time passes, and both producers and consumers begin to understand the new medium, it can develop and transform into something that further utilizes its own qualities, which is slowly happening already with the online newspaper, and evolves, possibly to something else besides the (present) concept of a newspaper. This total transformation will take time, however, and depends on how the interplay between old and new is exploited. Such transformation is not exclusive to digital versions of newspapers. Because the print newspaper has been developed for more than 350 years, the newspaper concept is very well established. But within this definition it has evolved. Comparing present newspapers with those printed 50, 100, or 150 years ago, reveals that it is difficult to apply one definition that will cover the entire period (Falkenberg, 2006).

Nonetheless, the newspaper metaphor may not be necessary to get consumers to read news online. On the WWW, the top-ranked news sites in 2007, in terms of visits, are not the ones provided by traditional newspaper companies, but by ISPs, such as *Yahoo*, MSNBC and *Google*[5] (Alexa, 2007; Nielsen/Netratings, 2007). These news sites are presented in common web page presentation, and let the user scan a huge amount of news services according to a set of standardized criteria, or according to a set of personalized criteria (e.g., Finnemann, 2006). Mainly, they consist of automatically aggregated content, where censorship and editorial judgement are not accounted for. It is not obvious, whether or not the audience reach of these news sites is included in the visit rates of the other sites of these companies, as they offer very popular services that are not news-related. Another untraditional influential way of mediating news online is the *blog*[6] and other forms of participatory information activities, with no standardized presentations. These may change the practice of news, either by adding new and richer journalism, breaking the barrier

[5] In addition to being the top ranked visited sites overall in the world (Alexa, 2007).
[6] Where a blog can be regarded as a cross between a newspaper column and a diary (NE, 2007). See also Section 3.1.2.

between producers and consumers, or empowering amateurs and threatening professional standards. Blogs are succeeding because they are identifying topics that are not being dealt with by newspapers (Jenkins, 2006), and because they can provide more knowledge about a particular topic (Chinni, 2006) in comparison to newspapers. However, a specific blogger cannot have deep knowledge of all topics covered in a newspaper, and it would be too time-consuming for the reader to find all the news a newspaper covers by reading blogs (ibid.). Thus, according to Jenkins (2006) and Chinni (2006), as it is not possible for a newspaper to cover everything in specific interest areas, blogs serve as supplements to online newspapers, adding to the variety of information online.

5.2.3. Faith in technology

What causes people to accept a new medium? It is commonly stated in new media and communication research that the most important factor for the growth of a new medium is social need and readiness, without which a new medium can wait for decades to realize its potential, if it ever does. While this is true, it is here argued that social needs depend on the functionality of technology. If the functional improvements provided by a new medium, which in theory can be good, have not reached a certain level of technological sophistication, most users will not feel the need to use it. Consider, for example, the very slow market penetration of e-paper devices, preceded by e-books, in the 2000s, which positive attributes are not capitalized on by users because the technology is not good enough. Thus, for social institutionalization to occur, the technological state of an innovation needs to be sufficient, that is, more efficient, more qualitative, cheaper, and/or with less complexity than an old or competing new medium. Therefore, the endogenous factors are of at least as much importance for the process of a new technology, as exogenous factors, which besides social, also include aspects such as political, economic, and cultural (cf. Chandler, 2002; Stöber, 2004). Sometimes, but rarely, however, an innovation takes off despite low sophistication, because it provides a completely new service or supplies a radically different function, for example the unexpected take-off of SMS services on mobile phones. An application such as the e-paper news product seems at present doomed for the same reason as the device: The e-paper news product per se is not attractive enough for users to ignore the inadequate technology. In this sense, e-paper fits the description of disruptive innovations – the e-paper technology may have good qualities, but only a marginal market segment will currently value it.

Nevertheless, slow and poor development of innovations is, however, not uncommon. A reason for the often slow diffusion of an innovation is its relatively poor performance in its initial incarnations. Another reason is if the new innovation does not fit within the existing consumption system. The e-paper news product is born out of technology, not out of any particular need, (other than that the industry is determined to find a digital substitute for their print product). As e-paper possesses both these characteristics, it is particularly challenging to provide a product/service that is attractive to consumers. The online newspaper was neither, but has found a competitive niche, in general terms due to development of, for example, presentations on the WWW, network extensions, and display technologies, but also by having completely different (‘attractive’) modalities compared to its precursor.

At the same time, there is great faith in the technological advances of new media. Nunberg (1996:12) argues that "[o]ver the short term, to be sure, there are some technological predictions we can make with confidence. It is certain, for example that the 'twitchy little screens' will soon be replaced, that we will have displays before the turn of the century that are almost the equivalent of paper in their weight and flexibility, as well". Nielsen (1998) predicted that all users would have good screens and good bandwidth in 2008. Whatever "all" and "good" imply is unclear, but according to Nielsen, by 2008 all computer users would prefer using the WWW to reading printed pages. It is also commonly believed that "technological developments occur in a comparatively rapid pace, whereas changes regarding utilisation and consumption are slower" (Bergström, 2005b:235), and faster than in the past (e.g., Murdoch, 2005). The newspaper industry's fear and hope have also been advocated by this faith. In the 1990s, the industry, among others, was convinced that new technologies would rapidly displace traditional newspapers, but turned around to scepticism when online newspapers failed to diffuse as rapidly as expected. Still in 2007, the attitudes remain uncertain as to whether the online newspaper will be considered a self-sustaining newspaper channel, or mainly retain its status as a crash test dummy for concepts of digital newspapers until a "real" digital replacement for the print channel turns up, or, as Krumsvik (2006:285) puts it: Is it marketing of the print product, the development of new business, or are the newspapers still in an explorative mode? These attitudes are highly dependent on the current market, and at present seem to be more positive, with recent increments in internet advertising.

As the industry continues to look for new ways to publish material in electronic form, history might repeat itself, as new rounds of communication technology often evoke the same patterns of expectation (Paisley, 1993:222, in Kyrish, 1996:24). Regarding the potential of the e-paper news product, many of the strategies currently presented by the industry have been pronounced before, in the mid 1990s, in similar forms (cf. Cameron *et al*., 1996; Fidler, 1997; Picard and Brody, 1997). But they reappeared again as 'new' in the beginning of the 2000s (e.g., Diginews, 2003; Zinnbauer, 2003), when technological breakthroughs were made, and were promoted by influential opinion leaders. Again a digital newspaper, the e-paper, was predicted to replace the print newspaper within a decade or two (ibid.). Now, past the middle of the 2000s, the industry is less enthusiastic, largely due to the inadequate and slow technological development, and non-existing successful business models, in parts similar to previous digital ventures. Nonetheless, many developers also believed in fast development of e-paper technology (e.g., AFAICS, 2005; Thomas, 2006).

In light of the above, it seems that the newspaper industry suffers from techno-myopia, and that they are especially sensitive to market trends. One must keep in mind, however, that the industry is being kept at the tip of the sword by the changing media environment, that they are not the only ones that surrender to these tendencies, and that they have responded to evolutionary change, e.g., a disruptive innovation, even though they have not addressed it thoroughly yet. Nevertheless, the first universally successful digital newspaper, the online newspaper, has only existed for a short period of time, yet has diffused quickly, independent of more than a decade of considerable experimentation with content, technology and distribution. Compared to the traditional newspaper concept that has been developed over a period of 400 years, 15 years is a short period of time. Although

the industry tries to be attentive to new innovations, disruptive technologies, they are, however, vulnerable to making late entries into markets already filled with powerful players, in the current state, much due to their undeveloped strategies.

5.2.4. Diffusion of newspaper media channels

Life cycle stages of newspaper channels situation

The e-paper newspaper product is in its *birth* stage, although the technology itself has entered the *market penetration* stage. Introducing a news product with the present e-paper device technology would entail pushing an undeveloped product into the marketplace. Though this might not lead to premature demise, it would likely lead to cocooning, thus a period that will be mainly marked by expenses. As the technology becomes cheaper, and technology, functions and content improve, in addition to improved production workflows and product strategies, the medium could succeed in a second interaction. For most companies, it may be advisable to wait until this phase, whereas companies that are able to hibernate in times of low sales, and able to exploit the uniqueness of the technology, can take advantage of the first-mover advantage and introduce it earlier. E-paper technology per se has great potential as an application for newspapers and other periodicals, if, or when, the technology reaches the sophistication that has been forecasted[7]. If it is successful as a newspaper product, this will also greatly push the diffusion of the e-paper device. However, many innovations never reach the next stage, for example, if new media with qualities exceeding the ones of e-paper are introduced on the market, e-paper technology may not continue its product life cycle.

The online newspaper is well into its *growth* stage, although the internet medium has past into the *maturation* stage of more than 50% audience penetration, see Figure 3.3, approximately one decade into its commercial introduction. There are several reasons for the fast growth of online newspapers. As regards the internet medium in general, the multi-function of the WWW, the interactivity/network possibilities, and the technological infrastructure, have boosted adoption, and specifically for the online newspaper; the cost-benefit, the immediacy, and the developing user-friendliness. Although publishers are annoyed that news on the internet is given away for free, this has stimulated the online newspapers' fast diffusion[8], like the diffusion of many other successful digital applications, for example the operation systems *Linux*, the search service *Google*, and the internet protocol (IP) telephony *Skype*, which have also used business models different from those traditionally used by newspaper companies. Every new medium has to find an appropriate business model. When it has been found, diffusion of the new medium has overcome its greatest barrier, according to Stöber (2004). Moreover, consumers see free availability of digital newspapers, and free newspapers (Wadbring, 2006), as a main advantage compared with the traditional print newspaper.

---

[7] E.g., see Section 5.2.6 and Paper III-IV.

[8] Though simplified, compare with the printed newspapers of the 17th century, which were expensive, but not as expensive as handwritten newsletters, or when improvements in technology made the newspaper a mass medium in the 19th century due to cheap production processes.

Print newspapers have begun their *defensive resistance* stage. The decline of the print newspapers is not immediate but slow, and at present revenues are actually increasing. Through adaptation – creative technological response by offering venturing digital channels, cutting process costs, and developing format, content, and presentation – and through convergence – experimentation and venturing with new ways of publishing and alternative output media forms, sometimes through mergers of other media companies – print newspaper companies are making an effort to find new ways, and/or increase profitability. Although Fidler (1997) claims that no streamlining can be done in the newspaper production's front-end departments, only in the back end, i.e., the delivery of content, Leckner (2004) for example, shows that improvements in production efficiency can be made in the prepress production.

Media competition

The fundamental question concerning the impact of new media on the traditional newspaper medium and its industry hinges on the print newspaper's 'to be or not to be'. Opinions regarding this matter seem to diverge: While media theorists and many consumers on one end of the continuum question the notion that the introduction of new media will not cause major changes for existence of the traditional newspaper medium (e.g., Wadbring, 2006; Bergström, 2006), other theorists and some industry representatives on the other end suggest a revolution in the way people consume different media, ultimately leading to the death of the traditional newspaper. Some with very definite timeframes for such a death: Nielsen (1998) before year 2008, Fidler (2000) before 2020 and Meyer (e.g., 2004) 2040, while others are more vague (e.g., Mitchell, 1995, in Heilesen and Wille, 2004 and in Falkenberg, 2006; Negroponte, 1995; Lehman-Wilzig and Cohen-Avigdor, 2004). In between these two extremes, which seems to be where most theorists and some industry actors are at present, there are claims that digital and traditional newspaper media will not compete but complement each other, at least for the time being (e.g., Althaus and Tewksbury, 2000; Chang and Leung, 2005; Ahlers, 2006). This part of the industry (e.g., Murdoch, 2005; Askman, 2006) does not consider online newspapers as the main competitor to the printed counterparts; on the contrary, it feels that the success of the online world begets greater success in the print medium.

These opinions range from being based on empiric observations of the industry, to being plainly opinionated, or based on empirical experiments and surveys[9]. What these diverging opinions suggest, is that it is hard to tell exactly how new media impact the newspaper mass medium at present, and what their implications will be for the future of the print newspaper and newspaper consumption.

Functional niches of newspaper media

Given the current state of declining circulation, and the increasing number of consumers choosing the internet as their news source, a competitive displacement between print and online newspapers would be assumed, and in the long term functional multiplicity. However, because statements regarding the actual decline diverge, and research regarding this matter is contradictory, it may be too soon to tell. Nevertheless, competitive

[9] See Section 3.2.3.

displacement of newspapers has occurred before with radio and television media. But these media were very different from print newspapers. From the newspaper companies' point of view, they were at best alternative ways of receiving news, and at worst direct competitors; they could not be a part of the newspaper medium[10]. This is not true with digital media, such as the internet. To a certain extent, the internet resembles every traditional media, yet it involves multiple communication modes that operate simultaneously, simply not imitating any other media experience. As a consequence, new media forms offer similarity, but the overlap between the gratifications offered by online and print newspapers is low, leading to greater possibility for media complementarity, compared to other traditional mass media, such as television[11]. Competitive displacement is more probable with a newspaper medium that inherits the characteristics of print, in addition to the qualities of a digital medium. Although an e-paper news product has a digital origin, thus is in many ways comparable to the online newspaper, it could – if it were to achieve the technological state it aspires to – exhibit most of the advantages of paper: it meets the same needs as the older medium, in addition to adding value; it is superior to the older form, thus it will be a fierce competitor to the traditional newspaper. As the online newspaper, like e-paper, is digital, and has similar characteristics, competitive displacement would seem likely. At present, however, both producers and consumers consider a potential e-paper news product to be a 'new' newspaper medium, not an output medium used to reproduce the online newspaper, thus mainly a competitor to the print newspaper.

Given the current state of e-paper technology, however, diffusion would be expected to be slow, as the traditional newspaper still meets most consumer needs, in addition to being very well established. With present e-paper technology, one potential functional niche for the e-paper news product would be at places where print media are not delivered, or when print newspapers are not delivered (e.g. holidays), as digital media in general will have a functional niche at places where media have traditionally not been, or cannot be, consumed (Abercrombie and Longhurst, 1998, in Westlund, 2006:11). This niche overlaps with that of personal computers. Thus, a further niche would be when personal computers are not suitable: when mobility is essential, for example at off-places, and in light ambient conditions. This niche, however, would overlap with mobile news services, where the advantage of the e-paper would be its screen size, and possibly its better adaptation to intense ambient light, thus making it more suitable for newspaper presentation and reading. But, as with mobile services (Westlund, 2006), this niche will be very small, as it will only be used occasionally, that is, present technology lacks 'killer' value.

5.2.5. Media experience of the newspaper concept

To get the reader to read the newspaper independent of the medium it is presented through, can be assumed as one main aim of newspaper producers. Thus, the medium should largely be immediate, i.e., the user should be so absorbed by the interface, content and design that the medium itself does not matter. For both paper and screen media, reading should be effortless. Added values such as services and multiple media are, on the other hand, often linked to hypermediacy, a condition of the medium.

[10] Although newspaper companies could financially converge.
[11] See Section 3.2.3.

Hardware technology

"Nobody is going to sit down and read a novel on a twitchy little screen. Ever" (Proulx, 1994:6§). There is a great distance between this statement and the optimistic prediction made by Nielsen (1998), claiming that no one will prefer printed media in favour of displays by the year 2008. Technological developments have come quite far from Proulx's pessimistic claim, but not quite as far as Nielsen's.

Display-based communication media are generally becoming lighter, faster, and cheaper, and somewhat less slowly they are achieving faster connectivity and longer battery-life, all of which positively affect usability. The screen size, however, which greatly affects immediacy, is not necessarily increasing. At present, portable computer displays are in fact getting smaller, largely due to the goal of decreasing the weight and power-consumption of the device, and increasing the portability. Rapidly diffused device technologies are not necessarily made for multi-functions, for example the iPod, or used for multi-functions, for example mobile phones. Nysveen *et al*. (2005:330) argue that consumers still use mobile devices mainly for simple services such as voice services and text messaging, despite the fact that the devices allow ubiquitous, universal and personal access to information and services, and Westlund (2007) shows that consumers have a reserved attitude towards using mobile phones for news consumption.

Reproduction, for example readability, is improving through increased display resolution, luminance and contrast ratio. But the most popular display devices today, based on LCD technology, are fragile and relatively heavy, as they consist of glass components. For the same reason, they are not foldable and bendable, they do not (commonly) work under extreme conditions (cold or hot places), or under especially light ambient conditions (for example direct sunlight). These factors limit universal utilization, and slow down the diffusion of potential applications for display-based media. Thus, FDTs such as e-paper might replace glass-based displays for many applications when the technology has reached a mature technological state. However, according to Crawford (2005a), it may be difficult for FDTs to compete on the basis of cost alone in the inexpensive and small display module market, or in the high-end high-performance market, whereas niche markets are more likely, where the technologies' positive attributes can clearly be capitalized on. Applications such as reading devices for digital newspapers, other periodicals and books are theoretically a good idea. That is, if the technological utopia would hold true and the e-paper displays become bendable, foldable and/or rollable, but still robust, have a reflectance/contrast ratio/resolution comparable to or better than paper, with full colour, and magazine-sized, with very low power consumption. At present, they are far from that, and developments are slow, even though they are somewhat more ready for the general consumer market than when Fidler (1999) advised against them in 1999.

Presentation style and format

Regardless of newspaper medium, formats are getting smaller, something that consumers seem to approve of. One of the main challenges (regarding presentation) in initiating new formats is how to adjust the presentation to, in most cases, a smaller format, how to attract and keep readers' focus, and how to distinguish the presentation from other newspaper brands, while still maintaining brand identity, an issue that have proven to be more difficult in a smaller format, compared to a larger one. For print newspapers, the conceptualizing into more compact formats makes articles shorter and favours the predominance of the visual, with foremost larger images. This tendency moves print presentation towards that of the online newspapers. Online newspapers, on the other hand, show a tendency towards becoming similar to print through their use of more images, more cues, and a prominence structure, similar to the newspaper metaphor. With regard to the online newspaper, this is still experimentation. In the case of the print newspaper, there is a tendency among industry actors to try to free themselves from prejudices and predispositions, and to start thinking like their youngest consumers, a target group extremely coveted by the industry. As the ability to change is one of the most important factors in the success of a newspaper company (Cepiate, 2006:38), one of the main obstacles to the future development of the newspaper industry and newspaper concept is the industry's previous demonstrated inflexibility and slowness when it comes to change. But in contrast to being too inflexible, there is the risk of being pressured to sell the new on the heels of the old, to dismiss the print newspaper as out-of-date and supersede it, or change it to such an extent that it is loses what traditionally has constituted the advantage of the print newspaper medium above other media. That is, if the industry changes and develops the newspaper concept too much, based on their beliefs about what young readers want in their willingness to attract new consumers, they might end up with nothing at all. There is a reason why print newspapers constitute one of the most powerful news media in the world, and have held this position for a very long time. This reason should be emphasized. Further developments towards smaller formats, shorter articles, larger images and/or softer news may push established readers towards other forms of news media. Changing and softening the online newspaper concept towards sites frequently populated by younger persons, may push the industry to compete with ISPs with high economic potential, a battle that many companies would not win.[12]

Habits and routines

Is it mainly disinterest in the 'old' newspaper medium, and mainly by young persons, that has caused the downward spiral in print circulation? Consumption behaviour is believed to be established in youth, for example Meyer (2004:17) claims that each generation keeps roughly the reading habits they established by time they reached voting age. But as interests, habits and routines (e.g., work, commuting, leisure time), and access to media, will change several times during a person's lifetime, it seems likely that these changes also affect the consumption behaviour of newspapers. Moreover, the age group younger than 20

[12]However, the acquisition of *Myspace*[12] in 2005 by Rupert Murdoch's media group *News Corporation* – which among other things is the world's leading publisher of English-language newspapers (News Corp, 2007) – is an example of the opposite occurrence.

years is less likely to contain subscribers/continuous readers, whereas the 'older' younger readers, the age group between 25-40, would be the real threat as regards losing subscribers, as they have started to receive a steady income and to settle down, making them desirable and possible future subscribers. Thus, likely, however not less frightening for the industry, is that the downward trend is due to changing media habits, not mainly a disinterest in the print medium, and not mainly by the youngest consumers. For example, morning newspapers are traditionally mainly read in the morning at breakfast, and during commuting. Today, many people do not eat a traditional breakfast, but instead eat at work, at school or on the way to these activities. The reader may like to read the print newspaper, but cannot fit it into his or her daily routines. When a time spot appears, the print newspaper might not be available, and the internet may be used for updates instead, or time might be limited, thus the internet is more convenient for a quick update. Print newspaper as a phenomenon has a strong position also among younger people (cf., Wadbring, 2006), which is seen for example in the rapidly diffused free newspaper channel, but the prerequisites for when and how the readers consume newspapers have changed. Free newspapers have succeeded mainly because they have found a time niche in people's daily lives, to which the content has been adjusted, and they are easily available and free, not because they include such a sophisticated or value adding content per se. Thus, changing the print newspaper concept towards more leisure media may not be the answer. As with digital newspapers, it may be the strategies, for example business models and distribution, that have to be changed.

Content is king

In the conceptualization of media, one important aspect concerns whether a news medium is defined by its content, its output platform, or both. At the moment, the content is more or less connected to the medium it is presented on. But in the expanding number of media technologies, the increasingly competitive media market, and consequently increasing number of newspaper channels, content – unique, reliable, updated, deep, broad – is what is going to define a newspaper, not the medium. This will be the strength of newspapers compared to other digital news media. Nonetheless, the output medium is not a mere container, but provides the added value, which pronounces the content by taking advantage of the specific characteristics given by each medium.

5.3. Conclusion

Newspapers' 'to be or not to be' is, in a theoretical sense, dependent on what new media constitute. At present, this matter is difficult to comprehend. As the online newspaper, in its current form, has inherited the newspaper metaphor, it could be conceptualized as a newspaper, yet its digital origin will always separate it from the traditional meaning of a newspaper. As technologies, presentation styles, contents and behaviours develop, this difference will be augmented, shift, and finally disconnect the digital 'newspaper' from the concept of a newspaper. But for now the concept functions as a good transition into new ways of presenting news. Moreover, the obvious technological differences between analogue and digital, in addition to similarities in metaphor, make the present two forms of newspaper media complementary. If a new medium appears, exhibiting qualities closer to the print medium, in addition to being digital, levels of competitive displacement would be

expected. If, for example, the e-paper technology utopia comes true, it will be viable as a direct competitor, and print newspapers will be closer to facing competitive exclusion, although remain through functional multiplicity for a certain amount of time. However, whether this harsh competitor will be one or several FDTs or other upcoming mobile display technologies, and for which type of print newspapers this will happen first, is yet to be seen. Upcoming mobile phone technologies may become a competitor to FDTs, such as e-paper, for short updates but not for longer reading sessions, and free print newspapers, including short news, may be more appropriate reading in digital devices than are, for example, morning newspapers, thus they may be more exposed for competition. With present display technologies, where CRT is becoming obsolete, LCD is market leading, and FDTs are promising but too immature for a large newspaper consumer market to adopt, this matter is not imminent. Due to the pace of technological development, and the attachment to print, it will probably take a long time before one or several new media have been completely diffused and the print newspaper medium faces extinction. Thus, the present work emphasizes the importance of technology and its state of maturation in the adoption of a medium, as opposed to mere social change. The abovementioned would also be true for online newspapers if potential new media appear, but fear of extinction always concerns the print newspaper, that is, the concept is closely connected to the paper medium.

In the discussion of the future existence of the print newspaper medium, there are some notions that seem to die hard. One is that the newspaper industry is on the verge of a breakdown. It is not, though it is suffering from techno-myopia, is too sensitive to market trends, and still makes decisions based on beliefs rather than facts. Abandoning the print newspaper is implicitly considered something frightful, expressed as the death of the newspaper as a mass medium. Yet if the print newspaper were to be abandoned, it would be because one or several more appropriate media have come along, media preferred by consumers and advertisers. What the industry is afraid of, naturally, is that they are not the one providing the appropriate new media. It is possible that they cannot retain its former great power and enormous profits in the future, but become only one of many news media players. However, the newspaper industry has an enormous opportunity to differentiate themselves in a world where news is becoming increasingly commoditized, because they have the experience, the brands, the resources, and the know-how to develop and extend the newspaper concept, but needs to be more confident of this matter. When defusing the output medium's significance for the concept, as when the newspaper medium is transferred to digital media, the content, or message, should not be disarmed by softening or changing that which is the power of the newspaper message. Instead, the present message should be adjusted and benefit from the technology of the medium, so as to strengthen and add value to it, in order to augment the medium in the growing competitive media market. This refashioning and adaptation is a complicated and slow process, but driving the diffusion of digital newspapers. Another statement that dies hard in the adoption to digital technology is the notion that consumers do not like reading on computer displays. What differ to some extent from analogue media, is the utilisation and the reading behaviour; using digital media above analogue may often be a matter of choice, not inherently better or worse in absolute sense, just different, serving other purposes. With improved technology and slowly adapted presentation styles, consumers prefer the online newspaper for obtaining short updates and reading specific topics, whereas print

newspapers are used for longer more generalized reading sessions at offline places. E-paper reading behaviour seems to be a mixture of the behaviours of the aforementioned media forms, though not yet enough developed to show clear signs of how it will be used and its content consumed.

In conclusion: Is the medium the message? Yes, in the sense that, in the definition of mass medium, the strength of the newspaper message is that it is recognized as the newspaper concept. No, not in the sense that the message per se is dependent on the medium it is reproduced on, as a newspaper can be considered a newspaper even if presented online, however, the specific way the content is presented will always depend on the characteristics and technology of the medium. As for the future of the newspaper as influential mass media concept, the present work can be concluded by a quote of Hernadez (1996:9, in Boczkowski, 2004:65) statings that “the only things certain and unchanging facing the newspaper industry in the future are uncertainty and change”.

References

Adoni, H. and Nossek, H. (2001) The New Media Consumer: Media Convergence and the Displacement effect *Communications* 26(1) pp.59-83

Adoni, R. (2003) In Swedish: Pressure on the daily press IN Holmberg, S. and Weibull, L. (eds.) *Fåfängans marknad* SOM research 2002 33 Kungälv: SOM-institutet Göteborg University pp.157-168

AFAICS Research (2005) Technology *E-paper the future of print* http://epaper.org.uk/index.php?option=com_content&task=section&id=5&Itemid=31 Accessed Aug 15 2006

Ahlers, D. (2006) News Consumption and the New Electronic Media *The Harvard International Journal of Press/Politics* **11**(1) pp.29-52

Aikat, D. (1998) News on the Web: usage trends of an on-line paper *Convergence* 4(4) pp. 94-110

Alexa (2007) Alexa Top Sites *Alexa the Web* Information Company http://www.alexa.com/ Accessed Jun 4 2007

Alperstein, N. (2005) Living in an age of distraction: Multitasking and simultaneous media use and the implications for advertisers Communication Dept. Loyola College in Maryland *Unpublished article*

Althaus, S.L. and Tewksbury, D. (2000) Patterns of Internet and traditional news media use in a networked community *Political Communication* **17** (1) pp. 21-45

Alves, R.C. (2001) The future of online journalism: metamorphosis or mediacide? *Info - The journal of policy, regulation and strategy for telecommunications* 3(1) pp. 63-72

Amundson, K. (2005) Electrophoretic Imaging Films for Electronic Paper Displays IN Crawford, G.P. *Flexible Flat Panel Displays* Chichester, West Sussex: John Wiley & Sons pp. 369-392

Andersen, H. (1994) In Swedish: What is science theory and methodology IN Andersen, H. (ed.) *Vetenskapsteori och metodlära – En introduktion* Lund: Studentlitteratur pp.9-29

Andersen, A. (1999) *Technology Media Comm. Nordic M&A Trends Study* pp.1-72

Andersen, V. and Gamdrup, P. (1994a) In Swedish: Research methods IN Andersen, H. (ed.) *Vetenskapsteori och metodlära – En introduktion* Lund: Studentlitteratur pp.68-95

Andersen, V. and Gamdrup, P. (1994b) In Swedish: About problem formulation and project work methodology IN Andersen, H. (ed.) *Vetenskapsteori och metodlära - En introduktion* Lund: Studentlitteratur pp.31-67

Andersson, U. (2005) In Swedish: To read or not to read IN Bergström, B Wadbring, I. and Weibull, L. (eds.) *Nypressat Ett kvartssekel med svenska dagstidningsläsare* Göteborg: JMG pp. 123-140

Ang, I. (1990) The Nature of the Audience IN Downing, J. Mohammadi, A. and Sreberny-Mohammadi, A. (eds.) *Questioning the Media – A Critical Introduction* London: Sage

Appelgren E. (2007) Simultaneous Consumption of Media Content Services among Media Aware University Students *Submitted for publication*

Apple (2003) *Apple Displays Technology Overview* Apple Computer Inc. pp. 1-14 www.apple.com Accessed Aug 5 2003

Apple (2007) *iPhone* http://www.apple.com/iphone/technology/ Accessed Jun 6 2007

Aris, A. and Bughin, J. (2005) *Managing Media Companies Harnessing Creative Value* Chichester, West Sussex: Wiley and Sons Inc.

Askman, T. (2006) In Swedish: The Duracell mogul *Affärsvärlden* 48 (106) pp. 32-39

Bagdikian, B.H. (1990) *The media monopoly* 3rd ed. Boston, MA: Beacon Press

Barco (n.d.) Obsolete products *Prepress & Publishing* http://www.barco.com/prepress/en/products/product.asp?gennr=1215 Accessed Oct 26 2006

Benfield, R.W. (2006) General Description *Germany Press, Media, TV, Radio, Newspapers* http://www.pressreference.com/Fa-Gu/Germany.html Accessed Oct 24 2006

Bergström, A. (2005a) In Swedish: *News online News consumption practices on the Internet 1998 to 2003* Doctoral dissertation Dept. of Journalism and Mass Communication (JMG) Göteborg University

Bergström, A. (2005b) In Swedish: The morning newspaper among other media IN Bergström, B Wadbring, I. and Weibull, L. (eds.) *Nypressat Ett kvartssekel med svenska dagstidningsläsare* Göteborg: JMG pp. 219-238

Bergström, A. (2006) Changing Habits? Swedish Readers in Transition IN Leandros, N. (ed.) *The impact of internet on the mass media in Europe* COST International Conference Greece 26-29 Apr pp. 91-104

Bergström, A. and Wadbring, I. (2005) In Swedish: Introduction to a 25-year old IN Bergström, B Wadbring, I. and Weibull, L. (eds.) *Nypressat Ett kvartssekel med svenska dagstidningsläsare* Göteborg: JMG pp. 11-18

Bjereld, U. Demker, M. and Hinnfors, J. (1999) In Swedish: *Why science?* Lund: Studentlitteratur

Blickenstorfer, C. (2005) *A brief history of Tablet PCs* www.biovisualtech.com/tablet-PC.htm Accessed Apr 25 2007

Blumer, J. (1979) The Role of Theory in Uses and Gratification Studies *Communication Research* 6 pp.9-33

Boczkowski, P.J. (2002) The Development and Use of Online Newspapers: What Research Tells Us and What We Might Want to Know IN Lievrouw, L. and Livingstone, S. (eds.) *The Handbook of New Media* Trowbridge: SAGE Publications pp. 270-285

Boczkowski, P.J. (2004) *Digitizing the News - Innovation in Online Newspapers* p.4 Cambridge, MA: The MIT Press

Bolter, J.D. (1996) Ekphrasis, virtual reality, and the future of writing IN Nunberg, G. (ed.) *The future of the book* Berkeley, CA: University of California Press pp. 253-272

Bolter, J. D. and Grusin, R. (2000) *Remediation - understanding new media* 2nd ed. Cambridge, MA: MIT Press

Borrell, G. (2007) *Online newspaper revenues* gborrell@borrellassociates.com Accessed Jan 11 2007

Boumans, J. (2006) At last, the portable electronic paper *Buziaulane* buziaulane.blogspot.com/2006/01/at-last-portable-electronic-newspaper.html Accessed Aug 5 2006

Bower, J.L. and Christensen, C.M. (1995) Disruptive Technologies: Catching the Wave *Harvard Business Review* Jan-Feb pp.43-53

Brown, B. (2000) *Mass Communication* Theories http://physinfo.ulb.ac.be/cit_courseware/research/theories4.htm Accessed Apr 29 2007

Bryman, A. (2001) *Social research methods* New York, NY: Oxford University Press

Cai, X. (2005) An experimental examination of the computer's time displacement effects *New Media and Society* **7**(1) pp. 8-21

Cameron, G. T. Curtin, P. A. Hollander, B. A. Nowak, G. J. & Shamp, S. A. (1996) Electronic Newspapers: Toward a Research Agenda. *Journal of Mediated Communication* **11** 4-53

Cepiate, A. (2006) In Swedish: *Media producers and consumers – separate worlds?* Doctoral Thesis TRITA-NA-**0555** Dept. of Media technology and Graphic Arts CSC Royal Institute of Technology

Cestre, G. and Darmon, R.Y. (1998) *Intern. J. of Research in Marketing* **15** pp.123-135

Chan, A. and Lee, M. (2005) An mp3 a day keeps the worries away: exploring the use of podcasting to address preconceptions and alleviate pre-class anxiety amongst undergraduate information technology students IN Spennemann, D.H.R. and Burr, L. (eds.) *Good Practice in Practice* Wagga Wagga, NSW: Charles Stuart University pp. 59-71

Chan, J. K. C. and Leung, L. (2005) Lifestyles, reliance on traditional news media and online news adoption *New Media and Society* 7(3) pp.357-382

Chandler, D. (2002) *Technological or Media Determinism* www.aber.ac.uk/media/Documents/tecdet/tecdet.html Accessed Apr 25 2007

Charles, L. (1992) The Keys *Seinfeld* **40** Los Angeles: NBC

Chinni, D. (2006) Why newspaper matter *MIT Communication Forum* http://web.mit.edu/comm-forum/forums/newspapers_matter.html#abstract Accessed Aug 26 2007

Christiansen, C.M. (1997) *The Innovator's Dilemma: When New Technologies Cause Great Firms to Fail* New York, NY: Harvard Business School Press

Christiansen, C.M. and Overdorf, M. (2000) Meeting the Challenge of Disruptive Change *Harvard Business Review* March-April pp.67-76

Conway, M. (2001) Cypernewsers, Deserters and Includers An analysis of internet News Users and the Effect on Traditional News Media Use *Association for Education in Journalism and Mass Communication Annual Conference* pp.1-31

Cooke, L. (2005) A visual convergence of print, television, and the internet: charting 40 years of design change in news presentation *New Media and Society* **7**(1) pp. 22-46

Cox, P. and Van De Walle, F. (2004) When is a bicycle not a bicycle? Vebmobiles and the Modelling of Transport Technologies *5th European Velomobile Conference* April Germensheim Germany

Crawford, G.P. (2005a) Flexible Flat Panel Display Technology IN Crawford, G.P. (ed.) *Flexible Flat Panel Displays* Chichester West Sussex: Wiley & Sons pp.1-10

Crawford, G.P. (2005b) Encapsulated Liquid Crystal Materials for Flexible Display Applications IN Crawford, G.P. (ed.) *Flexible Flat Panel Displays* Chichester West Sussex: Wiley & Sons pp. 331-354

Curtis, H. and Barnes, N.S. (1994) *Invitation to Biology* 5th ed. New York, NY: Worth Publishers

Dagspreskollegiet (2007) Research questions and framework *Dagspresskollegiet* http://www.dagspresskollegiet.jmg.gu.se/inenglish.html Accessed Apr 24 2007

Dapeng, W. Hou, Y.T. Wenwu, Z Ya-Quin, Z. and Peha, J.M. (2001) Streaming Video over the Internet: Approaches and Directions *IEEE Transactions on circuits and systems for video technology* **11**(3) pp. 232-300

Darwin, C. (1859, 1999) *On the Origin of the Species by Means of Natural Selection or The Preservation of Favoured Races in the Struggle for Life* 3rd ed. Borås: Natur och Kultur

Dawson, C. (2002) *Practical Research Methods - A user-friendly guide to mastering research techniques and projects* Oxford: How to books

De Bens, E. and Østbye, H. (1998) The European Newspaper Market IN McQuail, D. and Siune, K. (eds.) *Media Policy Convergence Concentration and Commerce* Trowbridge: SAGE Publications pp. 7-22

Deuze, M. (2003) the web and its journalism: considering the consequences of different types of newsmedia online *New Media and Society* **5**(2) pp. 203-230

Diginews (2003) Bouffioux, A. (ed.) *Full Project Proposal DigiNews News for mobile e-paper terminals* ITEA Internal Project 1

Dimmick, J. (1997) The Theory of the Niche and Spending on Mass media: The Case of the "Video Revolution" *Journal of Media Economics* **10**(3) pp.33-43

Dimmick, J. (2003) *Media Competition and Coexistence The Theory of the Niche* London: Lawrence Erlbaum Associates, Publishers

Dimmick, J. and Rothenbuhler, E. (1984) The Theory of the Niche: Quantifying Competition Among Media Industries *Journal of Communication* **34**(1) pp.103-119

Dimmick, J. Chen, Y. and Li, Z. (2004) Competition Between the Internet and Traditional News Media: The Gratification-Opportunities Niche Dimension *Journal of Media Economics* **17**(1) pp. 19-33

DN – Dagens Nyheter (2007) In Swedish: Record-high profitability for the Swedish press *Dagens Nyheter* Online www.dn.se Feb 20 2007

Duguid, P. (1996) Material Matters IN Nunberg, G. (ed.) *The future of the book* Berkeley, CA: University of California Press pp. 63-102

Dupange, M. (1997) Beyond the Principle of Relative constancy: Determinants of Consumer Mass Media Expenditures in Belgium *Journal of Media Economics* 10(2) pp. 3-19

Dutta-Bergman, M.J. (2004) Complementarity in Consumption of News Types Across Traditional and New Media *Journal of Broadcasting and Electronic Media* **48**(1) pp. 41-60

E-ink (2005) *High resolution displays* www.eink.com/products/matrix/High_Res.html Accessed Aug 23 2006

Ewart, J. (Sep 2003) News Connection: Regional newspapers and the Web *Transformations* transformations.cqu.edu.au/journal/journal.shtml Accessed Mar 17 2006

Fairchild, M. D. and Wyble, D. R. (Jul 1998) Colorimetric characterization of the Apple Studio display (Flat panel LCD) *Munsell Technical Report* pp.1-22

Falkenberg, V. (2006) Online Newspapers as Newspapers Online-Extending the Concept of 'Newspaper' IN Leandros, N. (ed.) *The impact of internet on the mass media in Europe* COST International Conference Greece 26-29 Apr pp. 105-118

Fidler, R. (1997) *Mediamorphosis Understanding New Media* Thousand Oaks, CA: Pine Forge Press

Fidler, R. (1999) The Pulse of Tablet Technology *Online Journalism Review* Apr 2

Fidler, R. (2000) Newspapers in 2020: Paper vs. Digital Delivery and Display Media *Future of Print Media Journal* pp. 1-5

Finnemann, N.O. (2006) Co-Evolution of Old and New Media IN Leandros, N. (ed.) *The impact of internet on the mass media in Europe* COST International Conference Greece 26-29 Apr pp. 105-117pp.43-54

Fischer, M. (2005) Podcasting: A made to order change for listeners-perhaps stations too *Washington Post* Online www.washingtonpost.com Accessed Apr 23 2007

Francisco, B. (2000) Descriptive Statistics IN Taylor, G.R. (ed.) *Integrating Quantitative and Qualitative Methods in Research* pp.105-128 Oxford: University Press of America

Frankfort-Nachmias, C. and Nachmias, D. (1996) *Research Methods in the Social Sciences* 5th ed. New York: St. Martin's Press

Garcia, M. R. (2005) The impact of the compact *A Garcia Media White Paper 1.0* pp. 1-23

Garrison, B. (2001) Diffusion of online information technologies in newspaper newsrooms *Journalism* **2**(2) pp.221-239

Gatingnon, H.A. and Robertson, T.S. (Mar 1985) A Prepositional Inventory for New Diffusion Research *Journal of Consumer Research* **11** (4) pp. 849-867

Gibson, J. E. and Fairchild, M. D. (Jan 2000) Colorimetric characterization of three computer displays (LCD and CRT) *Munsell Technical Report*, pp. 1-40

Glaser, A. and Strauss, B. (1967) *The Discovery of Grounded Theory* New York: Aldine

Golovchinsky, G. and Chignell, M.H. (1997) The newspaper as an information exploration metaphor *Information Processing and Management* **33** (5) pp.663-683

Graber, D.A. (1988) Processing the News How People *Tame the Information Tide* White Plains, NY: Longman Inc

Grant, R.M. (2002) *Contemporary Strategy Analysis – Concepts, Techniques, Applications* 4th ed. Oxford: Blackwell Business

Gummesson, E. (2000) *Qualitative Methods in Management Research* 2nd ed. Thousand Oaks, CA: Sage Publications

Gummesson, E. (2004) In Swedish: Case study based research IN Gustavsson, B. (ed.) *Kunskapande metoder inom samhällsvetenskapen* 3rd ed. Lund: Studentlitteratur pp. 115-144

Gyricon (n.d.) *Electronic Reusable Paper* http://www2.parc.com/hsl/projects/gyricon/ Accessed Aug 15 2006

Hadenius, S. and Weibull, L. (1999) In Swedish: *Mass Media – Press, radio and TV in transition* 7th ed. Falun: Albert Bonniers Förlag

Hall, B.H. and Khan, B. (2002) Adoption of New Technology IN Jones, D.C. (2003) *New Economy Handbook* Amsterdam: Elsevier Science

Hammersley, M. (2001) On Michael Bassey's Concept of the Fuzzy Generalisation *Oxford Review of Education* **27**(2) pp. 219-225

Hartman, J. (1998) In Swedish: *Scientific thinking - From knowledge theory to methodology theory* Lund: Studentlitteratur

Hedman, L. (2004) In Swedish: Daily newspapers on Internet IN Carlsson, U. and Facht, U. (eds.) *Mediasverige– statistik och analys* Kungälv: NORDICOM University of Göteborg pp. 85-89

Heilesen, S.B. and Wille, N.E. (2004) How to predict the future of print publishing Position paper for the workshop *Mastering the Future* Oct 23 Malaga pp. 1-6

Herring, S.C. Scheidt, L.A. Bonus, S. and Wright, E. (2004) Bridging the Gap: A Genre Analysis of Weblogs *Proceedings of the 37th Annual Hawaii International Conference on Publication* 5-8 Jan

Hess, T. (2005) Multimedia and Multidimensional: Concepts and Utilisation in the "Age of Digitalisation" IN Zerdick, A. Picot, A. Scharpe, K. Burgelman, J-C. Silverstone, R. Feldmann, V. (eds.) *E-merging Media* Berlin: Springer Verlag pp.57-74

Holme, I.M. and Solvang, B.K. (1997) In Swedish: *Research methodology – qualitative and quantitative methods* 2nd ed. Lund: Studentlitteratur

Hunt, R.G.W. (1987) *Measuring Colour* Chichester: John Wiley & Sons

IABEurope – Interactive Advertising Bureau Europe (2006) *Small ads are flooding away from newspapers and onto the internet* www.digitalstrategyconsulting.com/ IABeurope/IAB_Europe_stories/Story_149.htm Accessed Mar 21 2006

IABEurope (2007) Internet advertising revenues grow 35% in '06 hitting record close to $17 billion *IABNews* http://www.iab.net/news/pr_2007_05_23.asp Accessed Jun 12 2007

Intel (2007) Mobile internet devices and Ultra mobile personal computers *Products* http://www.intel.com/products/mid/index.htm Accessed Jun 6 2007

Jacobson, J. Comiskey, B. Turner, C. Albert, J. and Tsao, P. (1997) The last book *IBM System Journal* **36**(3)

Jenkins, H. (2006) News, information and the wealth of networks *MIT Communication Forum* http://web.mit.edu/comm-forum/forums/newspapers_matter.html#abstract Accessed Aug 26 2007

Jensen, J.F. (1998) Communication Research after the Mediasaurus? Digital Convergence, Digital Divergence *Nordicom Review* **12**(1) pp.39-52

Jensen, K.B. (2004) Contexts, cultures and computers - The cultural contexts of mediated communication IN Jensen, K.B. (ed.) *A Handbook of Media and Communication research Qualitative and Quantitative Methodologies* 2nd ed. London: Routledge pp.171-190

Johansson, L-G. (2003) In Swedish: *Introduction to scientific theory* 2nd ed. Stockholm: Bokförlaget Thales

Joubert, C. (2005) Latest developments in BiNem® LCDs *SID 05 Digest* p.1-4

Kalish, S. and Lilien, G.L. (1986) A Market Entry Timing Model for New Technologies *Management Science* **32**(2) pp.194-205

Katz, M.L. and Shapiro, C. (1985) Network effects, competition, and compatibility *American Economic Review* **75** (3) pp. 424-440.

Kayany, J.M. and Yelsma, P. (2000) Displacement Effects of Online Media in the Socio-Technical Contexts of Households *Journal of Broadcasting and Electronic Media* **44**(2) pp. 215-229

KB – Kungliga biblioteket (2006) In Swedish: *Newspaper, periodical, or advertisement paper* http://www.kb.se/TS/ts7.htm Assessed Jul 7 2006

Khattak, J. (Feb 2005) *The Bottom Line of Broadsheet-to Compact Format change* International Newspaper Marketing Association pp.1-25

Knudsen, C. (1994) In Swedish: Empirical analytical science theory Part I: Inductive and its critics IN Andersen, H. (ed.) *Vetenskapsteori och metodlära En introduktion* Lund: Studentlitteratur pp. 96-118

Krippendorff, K. (1986) *A Dictionary of Cybernetics* http://pespmc1.vub.ac.be/ASC/TECHNO_DETER.html Accessed Apr 25 2007

Krumsvik, A.H. What is the Strategic Role of Online Newspapers *Nordicom Review* **27**(2) pp.285-297

Kuhn, T.S. (1996) *The Structure of Scientific Revolution* 3rd ed. Chicago: U. of Chicago Press

Kwak, Y. and MacDonald, L. W. (2001) Accurate prediction of colours on liquid crystal displays *Proc. of IS&T/SID 9th Color Imaging Conference* pp. 355-359

Kyrish, S. (1996) *From Videotex to the Internet: Lessons from Online Services 1981-1996* **1** La Trobe University pp. 1-31

Lacy, S. and Niebauer, N.E. (1995) Developing and Using Theory for Media Economics *Journal of Media Economics* **8**(2) pp.3-13

Lacy, S. and Noh, G-Y. (1997) Theory, Economics, Measurement, and the Principle of Relative Constancy *Journal of Media Economics* **10**(3) pp.3-16

Lawson-Borders, G. Integrating New Media and Old Media: Seven Observations of Convergence as a Strategy for Best Practices in Media Organizations *The International Journal on Media Management* **5**(11) pp.91-99

Leckner, S. and Nordqvist, S. (2002) Soft Proofing using LCDs - Case Newspaper Workflows *Proceedings of the TAGA 2002 Conference* Ashville USA pp. 367-378

Leckner, S. and Nordqvist, S. (2003) Tolerance levels for standards in premedia colour workflows *Proceedings of the TAGA 2003 Conference* Montreal Canada pp. 90-108

Leckner, S. (2004) *Soft proofing using Liquid Crystal Displays – colour management for media production workflows* Licentiate thesis TRITA-0104 NADA Media technology and graphic arts Royal Institute of Technology pp. 1-122

Lehman-Wilzing, S. and Cohen-Avigdor, N. (2004) The natural life cycle of new media evolution *New media and Society* **6**(6) pp. 707-730

Leibold, M. A. (1995) The niche concept revisited: mechanistic models and community context *Ecology* **76**(5) 1371-1390

Lewis, K. (May 2004) Australian newspapers online: Four business models revisited *Media International Australia* 111 pp. 1-19

Levitt, T. (1960, 1975) Marketing Myopia *Harvard Business Review* **53**(5) pp. 26–44, 173–181

Levitt, T. (1965) Exploit the Product Life Cycle *Harvard Business Review* **43** Nov-Dec pp. 81-94

LG. Philips (2007) LG.Philips LCD Develops World's First Flexible Color A4-Size E-Paper *News&Events*http://www.lgphilips-lcd.com/homeContain/jsp/eng/inv/inv101_j_e.jsp?BOARD_IDX=1280&languageSec=E&kinds=IN1 Accessed May 15 2007

Lievrouw, L.A. and Livingstone, S. (2002) The Social Shaping and Consequences of ICTs IN Lievrouw, L. A. and Livingstone, S. (eds.) *The Handbook of New Media* Trowbridge: Sage Publication pp. 1-16

Lindberg, S. (2006) Market analyst TU Stockholm *Personal Communication* Oct 20 2006

Linzmayer, O.W. (2004) *Apple confidential 2.0: The definitive history of the world's most colourful company* San Francisco, CA: No Starch Press

Little, T.D.C. (1996) Technology and the News: What We Don't Know *IEEE Multimedia* pp. 73-77

Loechner, J. (2007) Death of Newspapers Belied By Facts, Says WAN *Media Post Publications*http://publications.mediapost.com/index.cfm?fuseaction=Articles.showEdition&art_send_date=2007-02-13&art_type=8 Accessed May 24 2007

Los Angeles Times (2006) Daily & Sunday Local Comparison *Circulation and readership* http://www.latimes.com/extras/ads/circ_02.html Accessed Oct 24 2006

Lundberg, J. (2004) *Shaping electronic news Genre perspectives on interaction design* Dissertation **918** Dept. Computer and Information Science HMI Linköping University Sweden

MacDonald, L. W. (1995) Developments in colour management systems *Displays* **16** pp. 203-211

MacDonald, B.A. Rollins, K. MacKerron, D. Rakos, K. Eveson, R. Hashimoto, K. and Rustin, B. (2005) Engineered Films for Display Technologies IN Crawford, G.P. *Flexible Flat Panel Displays* Chichester West Sussex: John Wiley & Sons pp. 11-34

Manovich, L. (2001) *Language of New Media* Cambridge, MA: MIT Press

Manovich, L. (2006) The poetics of augmented space *Visual Communication* 5(2) pp. 219-240

Marcu, G. Chen, W. Chen, K. Graffagnino, P. and Andrade, O. (2002) Color characterization issues for TFTLCD displays *Proc. of SPIE 2002* **4663** pp. 187-198

Matheson, D. (2004) Weblogs and the epistemology of the news: some trends in online journalism *New Media and Society* 6(4) pp. 443-468

McChesney, R.W. (2000) *Rich Media, Poor Democracy* New York, NY: The New Press

McCombs, M.E. (1972) Mass media in the Marketplace *Journalism Monographs* 24

McCombs, M.E. and Eyal, C.H. (1980) Spending on Mass Media *Journal Communication* **31**(1) pp.153-158

McCombs, M.E. and Nolan, J. (1992) The Relative Constancy Approach to Consumer Spending for Media *Journal of Media Economics* **5** (2) pp.43-52

McMillan, S.J. (2002) Exploring Models of Interactivity from Multiple Research Traditions: Users, Documents and Systems IN Lievrouw, L. A. and Livingstone, S. (eds.) *The Handbook of New Media* Trowbridge: Sage Publication pp.163-182

McLuhan, M. (1964) *Understanding Media* New York: Mentor

McLuhan, M. Agel, J. and Fiore, Q. (1967, 2001) *The medium is the message an inventory of effects* 4th ed. Corte Madera, CA: Gingko Press

McQuail, D. (2004) Identifying the Field IN *The SAGE Handbook of Media Studies* Downing, J.D.H. McQuail, D. Schlesinger, P. and Wartella, E. (eds.) Thousand Oaks, CA: Sage Publications

McQuail, D. (2005) *McQuail's Mass Communication Theory* 5th ed. London:Sage

Metro (2007) *Overview* http://www.metro.lu/overview/index.htm Accessed Mar 6 2007

Meyer, P. (2004) *The Vanishing Newspaper Saving Journalism in the Information Age* Columbia: MI: University of Missouri Press

Miles, M.B. and Huberman, A.M. (1984) *Qualitative Data Analysis - A Sourcebook of New Methods* 2nd ed. Beverly Hills, CA: SAGE Publications

Mings, S. and White, P.B. (1997) Making money from the Web? Business models for online news *Business brief* 1 La Trobe University Melbourne Australia

Mings, S. and White, P.B. (2000) Profiting from online news: The search for viable business models IN Kahin, B. and Varian, H.R. (eds.) *Internet publishing and beyond: The economics of digital information and intellectual property*, Cambridge, MA: The MIT Press

Mishra, V.M. (1980) The Future of the Newspaper Industry in America: Some Research Contingencies and Portents *International Communication Gazette* 26 pp. 17-29

Molina, A. (1997) Issues and challenge in the evolution of multimedia: the case of the newspaper *Futures* **29** pp. 193-212

Moore, G.A. (1991) *Crossing the Chasm: Marketing and Selling High-Tech Products to Mainstream Consumers* New York, NY: HarperCollins

Murdoch, R. (2005) *Speech by Rupert Murdoch to the American Society of Newspaper Editors* Press Releases News Corporation Accessed Apr 4 2007

Myers, M.D. and Avison, D.E. (2002) An introduction to Qualitative Research in Information Systems IN Myers, M.D. and Avison, D.E. (eds.) *Qualitative Research in Information Systems* Gateshead: Sage Publications pp. 3-12

NAA – Newspaper Association of America (2005a) *The Source Newspapers by the Numbers* http://www.naa.org/Trends-and-Numbers/Market-Databank/Industry-Statistics.aspx Accessed Aug 5 2006

NAA – Newspaper Association of America (2005b) Print and Online Newspaper Advertising Up 2.4 % in Q3; Up 2.9 % in First Nine Months of 2005 www.naa.org/Advertising-and-Marketing/Trends-and-Numbers Accessed Mar 20 2006

NE – Nationalecyclopedin (2007) Bloggar *Ne.se* http://www.ne.se/jsp/search/article.jsp?i_art_id=652248 Accessed Sep 26 2007

Negroponte, N. (1995) *Being Digital* New York, NY: Basic Books

Neuberger, C. Tonnemacher, J. Biebl, M. and Duck, A. (1998) Online - The Future of Newspapers? Germany's Dailies on the World Wide Web *Journal of Computer Mediated Communication* pp.1-22

Neuman, W.R. (1991) *The future of the mass audience* New York, NY: Cambridge University Press

News Corporation (2007) Newspapers http://www.newscorp.com/operations/newspapers.html Accessed Aug 30 2007

Nguyen, A. and Western, M. (2006) The complementary relationship between the Internet and traditional mass media: the case of online news and information *Information research* **11**(3)

Nielsen, J. (1998) The End of Legacy Media (Newspapers, Magazines, Books, TV Networks) *Alertbox* http://www.useit.com/alertbox/980823.html Accessed May 20 2007

Nielsen/Netratings (2007) Top News Sites for March *The online news association* http://www.cyberjournalist.net/news/004187.php Accessed May 20 2007

Nilsson, Å. and Severinsson, R. (2001) In Swedish: *Trends and traditions in Swedish morning press 1987-1999* Dagspresskologiet Dept. of Journalism and Mass Communication Göteborg University

Nilsson, Å. (2005) In Swedish: Media utilisation in daily life IN Bergström, A. Wadbring, I. and Weibull, L. (eds.) *Nypressat Ett kvartssekel med svenska dagstidningsläsare* Göteborg: JMG pp. 97-122

NMP – Nordic Media Policy (Dec 2006) Flisen, T. (ed.) *Nordic Media Policy A newsletter from NORDICOM* **5**

NORDICOM (2004) Carlsson, U. and Facht, U. (eds.) In Swedish: *Media in Sweden – Statistics and analysis* Kungälv: NORDICOM Göteborg University

NORDICOM (Feb 2005.1) In Swedish: *The media barometer 2004* MedieNotiser 1 Göteborg University

NORDICOM (Jun 2005.2) In Swedish: *The internet barometer 2004* MedieNotiser 2 Göteborg University

NORDICOM (2007) *Newspaper revenues 1995-2005* www.nordicom.gu.se Accessed Apr 13 2007

NORDICOM (2007.1) Carlsson, U. and Facht, U. (eds.) In Swedish: *Nordicom - The Swedish media barometer* MedieNotiser 1 Göteborg University

Nunberg, G. (1996) Introduction IN Nunberg, G. (ed.) *The future of the book* Berkeley, CA: University of California Press pp. 9-20

Nysveen, H. Pedersen, P.E. and Thorbjørnsen, H. (2005) Intentions to Use Mobile Services: Antecedents and Cross-Service Comparisons *Journal of the Academy of Marketing Science* **33**(3) pp.330-346

OLPC (2007) *One Laptop Per Child* laptop.org/index.shtml Accessed Apr 25 2007

Patel, R. and Davidson, B. (1994) In Swedish: *Fundamentals of research methodology Planning, implementing and reporting an investigation* 2nd ed. Lund: Studentlitteratur

Patton, M.Q. (1990) *Qualitative evaluation and research methods* 2nd ed. Newbury Park, CA: Sage Publications

Pavlik, J.V. and McIntosh, S. (2004) *Converging Media An Introduction to Mass Communication* Boston, MA: Pearson Education, Inc.

Peirce, C.S. (1903) IN Hartshorne, C. Weiss, P. and Burks, A. (eds.) (1931-1958) *Collected Papers of Charles Sanders Peirce* **8** Cambridge, MA: Harvard University Press

Petrovic, Kittl, C. and Teksten, R.D. (2001) Developing Business models for eCommerce *Proceedings of International Conference on Electronic Commerce 2001* Oct-Nov Vienna Austria

Peurell, E. Weibull, L and Hjerppe, R. (1994) In Swedish: Electronic publishing *Nationalencyklopedin* www.ne.se Accessed Mar 16 2007

Picard, R.G. and Brody, J.H. (1997) The *Newspaper Publishing Industry* Needham Heights, MA: Allyn and Bacon

Pidgeon, N. and Henwood, K. (2004) Grounded Theory IN Hardy, M. and Bryman, A. (eds.) *Handbook of Data Analysis* Trowbridge: Sage Publication pp. 649-666

Pilotta, J. and Schultz, D. (2005) Simultaneous Media Experience and Synesthesia *Journal of Advertising Research* **45** (1) pp.19-26

Plichta, A. Habeck, A. Knoche, S. Kruse, A. Weber, A. and Hildebrand, N. (2005) Flexible Glass Substrates IN Crawford, G.P. *Flexible Flat Panel Displays* Chichester West Sussex: John Wiley & Sons pp. 35-56

Proulx, E.A. (1994) Books on top Technology *The New York Times* http://www.nytimes.com/books/99/05/23/specials/proulx-top.html Accessed Jun 4 2007

Raeymaeckers, K. (2002) Research Note: Young People and Patterns of Time Consumption in Relation to Print Media *European Journal of Communication* **17** (3) pp. 369-383

Rawolle, J. and Hess, T. (2000) New Digital Media and Devices An analysis for the Media Industry *The International Journal on Media Management* **2**(11) pp. 89-99

Robertson, T.S. (1967) The Process of Innovation and the Diffusion of Innovation *Journal of Marketing* **31**(1) pp.14-19

Robinson, J.P. Barth, K. and Kohut, A. (1997) Personal computers, mass media, and use of time *Social Science Computer Review* **15**(4) pp.65-82

Robinson, J.P. Kestnbaum, M. Neustadtl and Alvarez, A. (2000) Mass Media Use and Social Life Among Internet Users *Social Science Computer Review* **18**(4) pp.490-501

Rogers, E.M. (2003) *Diffusions of innovations* 5th ed. p. 215 New York, NY: Free Press

Rosenberg, N. (1972) Factors Affecting the Diffusion of Technology *Explorations in Economic History* **10**(1) pp. 3-33

Saffo, P. (1992) Paul Saffo and the 30-year rule *Design World* 24 pp.16-23

Severin W.J. and Tankard, J.W. (1997) *Communication Theories: Origins, Methods and Uses in the Mass Media* 5th ed New York, NY: Longman

SFS – Statens författningssamling (1990:524) In Swedish: *The press subsidy regulation (1990:524)* (Presstödsförordningen) 6§ http://rixlex.riksdagen.se Accessed Aug 7 2006

SFS – Statens författningssamling (1993:1392) In Swedish: *Duty copies of documents (1993:1392)* 2§ http://rixlex.riksdagen.se Accessed Aug 7 2006

Shapiro, C. and Varain, H.R. (1999) *Information Rules A Strategic Guide to the Network Economy* Boston, MA: Harvard Business School Press

Shoemaker, P.J. Tankard, J.W. and Lasorsa, D.L. (2004) *How to Build Social Science Theories* Thousand Oaks, CA: SAGE Publications

Sifomedia – Sifo research international (2004) In Swedish: Newspaper advertising *Marknadsbild:Dagspress*http://www.sifomedia.se/Public/MediaChannels/Print/Index.aspx Accessed Jun 11 2007

SNM – The State of the News Media (2005) Daily newspaper advertising revenue *Newspapers* http://www.stateofthenewsmedia.org/2005/ Accessed Aug 5 2006

SNM – The State of the News Media (2006) Daily newspaper advertising revenue *Newspapers* http://www.stateofthenewsmedia.org/2006/ Accessed Aug 7 2006

Son, J. and McCombs M.E. (1993) A Look at the Constancy Principle Under Changing Market Conditions *Journal of Media Economics* **6**(2) pp. 23-36

Sovereign Publications (2006) Daily newspapers – De Telegraaf *De Telegraaf* http://kundwebb.eniro.com/templates/wideContent.asp?id=2100 Accessed Oct 24 2006

Sparks, C. (2000) From Dead Trees to Live Wires: The Internet's Challenge to the Traditional Newspaper IN Curran, J. and Gurevitch, M. (eds.) *Mass Media and Society* 3rd ed. London: Hodder Headline Group pp. 269-292

Spyridou, L-P. and Veglis, A. Online Newspapers in Greece: the Evolution of a Digital Genre IN Leandros, N. (ed.) *The impact of internet on the mass media in Europe* COST International Conference Greece 26-29 Apr pp.207-222

Staat, W. (1993) On abduction, deduction, induction and the categories *Transactions of the Charles S. Peirce Society* 29 pp.225-237

Stake, R. E. (1995) *The Art of Case Study Research* Thousand Oaks: Sage Publications

Stempel, G.H. Hargrove, T. and Bernt, J.P. (2000) Relation of the Growth of Use of the Internet to Changes in Media Use from 1995 to 1999 *Journalism and Mass Communication Quarterly* 77(1) pp. 71-79

Sternvik, J. (2005b) In Swedish: Trends in format and content of daily newspapers – Dagens Nyheter during the 20th century IN *Presshistorisk årsbok 2005* Stockholm: Presshistoriska föreningen

Sternvik, J. Weibull, L. and Nilsson, Å. (2005) In Swedish: Newspaper reading's theory and empiric IN Bergström, A. Wadbring, I. and Weibull, L. (eds.) *Nypressat Ett kvartssekel med svenska dagstidningsläsare* Göteborg: JMG pp. 73-96

Stöber, R. (2004) What Media Evolution Is A Theoretical Approach to the History of New Media *European Journal of Communication* **19**(4) pp.483-505

Sundin, S. (2006) In Swedish: The Swedish media market 2006 *MedieNotiser* **3** Kungälv: Nordicom Sverige Göteborg Universitet

Surry, D.W. (1997) Diffusion Theory and Instructional Technology Paper presented at the *Annual Conference of the Association for Educational Communications and Technology* 12-15 Feb New Mexico

Taylor, G.R. and Trumbull, M. (2000) Major Similarities and Differences Between Two Paradigms IN Taylor, G.R. (ed.) *Integrating Quantitative and Qualitative Methods in Research* pp. 171-178 Oxford: University Press of America

Thomas, L. (Mar 2006) Tabloids as tablets? Here comes e-paper *Press Gazette* www.pressgazette.co.uk/article/230306/tabloids_as_tablets_here_comes_epaper

Timmers, P. (1998) Business models for Electronic Markets *Electronic Markets* **8** (2) pp.3-8

Toner, M. (2006) Tablet PCs Open the (Bathroom) Door *Newspaper Association of America* www.naa.se/TechNewsPub/New-Media/Wireless/Tablet-PCs-Open-te-(Bathroom)-Door.aspx Assessed Aug 5 2006

TS – Tidningsstatistik (2007) In Swedish: *Our areas of revision:* Daily press and journals http://www.ts.se/Public/OurRevServices/Circulation.aspx Accessed Sep 18 2007

TU – Tidningsutgivarna (2006a) In Swedish: *Swedish daily press 2006 – Facts of market and media* pp.1-26

TU – Tidningsutgivarna (2006b) In Swedish: *The daily papers* http://www.tu.se/dagstidningarna.jsp;jsessionid=1032091159365378234 Accessed Sep 27 2006

Turpeinen, M. (2000) *Customizing News Content for Individuals and Communities* Dissertation **103**, Dept. of Computer Science, Information Technology, Helsinki University

Turpeinen, M. (2003) Co-Evolution of Broadcast, Customized and Community-Created IN Lowe, G.F. and Hujanen, T. (eds.) *Media Broadcasting and Convergence: New Articulations of the Public Service Remit* Göteborg: Nordicom

Turpeinen, M. (2007) Professor in Media Technology CSC, KTH, *Personal Communication* May 24 2007

UNESCO – Institute for Statistics (2004) *Press-Daily and Non-daily newspapers* http://www.uis.unesco.org/ev.php?ID=5059_201&ID2=DO_TOPIC Accessed Aug 7 2006

USC – United States Code (1970) Public law 91-353 Stat. 466 Chap.43 Title.15 Sec.1802 http://uscode.house.gov/search/criteria.shtml Accessed Aug 7 2006

Wadbring, I. (2003) In Swedish: *A paper for its time?* Dissertation Journalism and Mass Communication Göteborg University

Wadbring, I. (2007) In Swedish: *Changed and never coming back? Young and various print newspapers* PM 64 Dagpreskollegiet Göteborg

Vaisnavi, V. and Kuechler, B. (2007) *Design Research in Information Systems* http://www.isworld.org/Researchdesign/drisISworld.htm Accessed Aug 24 2007

Wallén, G. (1996) In Swedish: *Science theory and research methodology* 2nd ed. Lund:Studentlitteratur

Walter, M. (2002) Assessing the Tablet PC's Potential for Commercial Publishing *The Seybold Report* **2**(18) pp.16-22

WAN – World Association of Newspapers (2004) *Newspapers: A Brief History* www.wan-press.org/aerticle.php3?id_article=2821 Accessed Jul 27 2006

WAN – World Association of Newspapers (2006) World Press Trends: Newspaper Circulation, Advertising Increases *World Press Trends 2006* www.wan-press.org/article11185.html Accessed Jul 6 2006

WAN – World Association of Newspapers (2007) "Total Youth Think": Newspaper Strategy for the Future *Shaping the Future of the Newspaper* www.wan-press.org/article12773.html Accessed Jun 12 2007

van Dijk, J. (2004) Digital Media IN Downing, J.D.H. McQuail, D. Schlesinger, P. and Wartella, E. (eds.) *The SAGE Handbook of Media Studies* Thousand Oaks, CA: Sage Publications

Van Weezel, A. (2006) *Financial and Strategic Position of Nordic Media Companies* JIBS Research Reports **2006-3** pp. 1-78

Weibull, L. (1994) In Swedish: Mass Communication Research *Nationalencyklopedin* www.ne.se Accessed May 7 2007

Weibull, L. (2004) In Swedish: Daily press IN Carlsson, U. and Facht, U. (eds.) *Mediesverige – statistik och analys* Kungälv: NORDICOM University of Göteborg pp.75-83

Weibull, L. (2005) In Swedish: Sweden in the newspaper world IN Bergström, B Wadbring, I. and Weibull, L. (eds.) *Nypressat Ett kvartssekel med svenska dagstidningsläsare* Göteborg: JMG pp. 19-48

Weibull, L. (2006) Professor in Journalism and Communication/SOM institute Göteborg University *Personal Communication* Oct 20 2006

Weir, T. (1999) Innovators or news hounds? A study of early adopters of the electronic newspaper *Newspaper Research Journal* Fall 1999

Westlund, O. (2006) www.news.mob.se; an analysis of uncertainties in the Swedish market Paper presented at the *3rd International CICT conference* 30 Nov-1 Dec Copenhagen Denmark

Westlund, O. (2007) In Swedish: *The mobile phone as multimedium and news medium – a consumer perspective* Report no **50** Göteborgs Universitet: Dagspresskollegiet

WFU (1999) www.wfu.edu/.../ IBM-idsa-electronicnewspaper.jpg Accessed Jul 03 2007

Yin. R.K. Case (1994) *Study Research - Design and Methods* 2nd ed. Thousand Oaks, CA: Sage Publications

Yoshida, Y. and Yamamoto, Y. (2000) Proposal for Color Management of LCD *Proc. of IS&T/SID's 9th Color Imaging Conference* pp. 233-238

Yoshida, Y. and Yamamoto, Y. (2002a) Precise color characterisation model for LCD and its evaluation of applicability *Journal of the ITE* **56** (8) pp. 1279-1290

Yoshida, Y. and Yamamoto, Y. (2002b) Color Calibration of LCDs *Proc. of IS&T/SID's 10th Color Imaging Conference*

Zinnbauer, M. (2003) e-Newspaper: Consumer Demands on Attributes and Features *The Intern. J. on Media Management* **5**(11) pp. 127-137