

EUROPEAN SOCIETIES AND EMERGING TECHNOLOGIES – DEBATE ON NANOTECHNOLOGY IN POLISH AND SWEDISH PRESS

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-Abstract-

This paper presents the results of the study of the media debates on nanotechnology in Swedish and Polish press between 2004 and 2009. It aims to answer following questions: How are risks and benefits related to nanotechnology framed in the Polish and Swedish press? What are the similarities and differences in the way of presenting risks and benefits of nanotechnology? Qualitative content analysis has been applied in order to investigate these issues. The results of the research shows that although both Polish and Swedish debates on nanotechnology are following some patterns observed in other countries, like the UK or Germany, there are significant differences between the coverage in these two states.

Key words: *nanotechnology, media debates on nanotechnology, social aspects of nanotechnology*

JEL Classification: Z00

1. INTRODUCTION

Nanotechnology is an emerging and rapidly developing technology that gradually enters new spheres of human activity for more than two decades. It allows manipulation of particular atoms and this may allow creating functioning mechanical applications, which can allow progress and significant changes in various sciences, technologies and many aspects of our live. As with other emerging technologies, once it entered the public sphere, nanotechnology attracted the attention of social scientists who came to be interested in its ethical, legal and social implications. Therefore, studies on media representations of nanotechnology have flourished during the last two decades. The main aim of these projects was to gain knowledge about the way nanoscience was discussed in the media, particularly the traditional press. This was done partly because an understanding of the public media framing of nanotechnology might be useful for those trying to engage the general public with the technology. In reports issued in 2010 and 2011, the European Commission highlighted “nano communication” as

one of the strategic areas in the wide field of nano-research (European Commission, 2010).

However, most of the former studies in this area focused on English speaking. This paper aims to break this tendency by moving the focus onto Poland and Sweden - countries that have not been studied in this context before.

2. FORMER STUDIES

Most former studies in this area investigated media debates on nanotechnology in the UK (Anderson et al., 2005), Canada (Devereaux et al., 2008; Laing, 2005) and the US (Faber et al. 2005; Fitzgerald, 2007; Gaskell et al., 2005; Stephens, 2005). Only few of them focused on other countries such as Germany (Grobe et al., 2005), Denmark (Kjærgaard, 2008), Italy (Arnaldi, 2008), the Netherlands (Kulve, 2006) and Norway (Kjølberg, 2009). These studies show that the general tone of articles discussing nanotechnology is positive in each of these countries. The most popular frames are progress and scientific discovery as well as business and economic benefits. However, while economic benefits and business frame are more popular in US media, the Canadian and European newspapers are more interested in such aspects as progress and scientific development. European and Canadian media are also more focused on the potential risks of nanotechnology, using a 'Pandora's Box' frame Gorss and Lewenstein (2005), which was also frequently used during debates about biotechnology or genetics. According to Gaskell et al. (2005) this phenomenon "turns into a trend – more emphasis on risk in Europe than in the US – then this is likely to have implications for public support for nanotechnology" (Gaskell et al., 2004:86). Kulve, who studied the Dutch nano-debate, states that with the development of the debate, the views presented in the media become more contrasted since the topic becomes more controversial.

3. AIMS & RATIONALE

This paper aims to discuss the way risks and benefits of nanotechnology are presented in the Swedish and Polish press. The main questions of this study are: How are risks and benefits related to nanotechnology framed in the Polish and Swedish press? What are the similarities and differences in the way of presenting risks and benefits of nanotechnology?

The choice of these two countries is dictated by different factors. Firstly, as mentioned before, neither Sweden nor Poland have been studied in this context before and therefore this paper fills a gap in the existing literature. Secondly, both countries differ from each other in terms of economy, technological development,

politics and culture. It should be noticed that Poland is a former communist country and a new member of the European Union, which is another important factor, especially as previous research on media debates on nanotechnology has never focused on a country that in the past belonged to the Soviet-block.

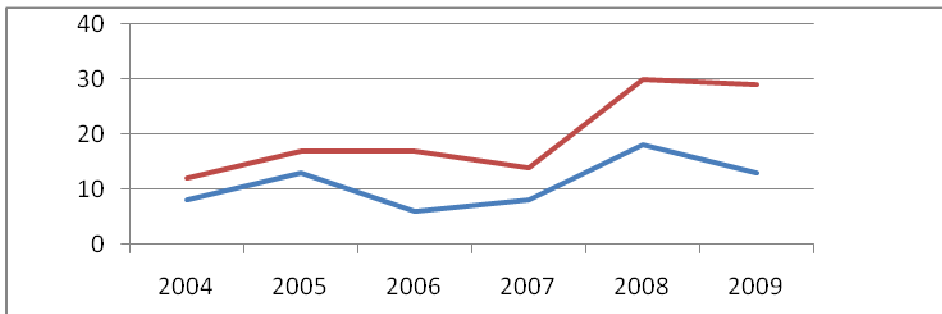
Nisbet and Scheufele (2009) argue that it is important to gain knowledge about the way representatives of different religions, cultures or nations perceive a particular technology (e.g. nanotechnology) before starting communicating this technology to the “lay public”. This paper aims to reveal these cross-cultural differences and investigate the characteristic elements of Swedish and Polish nano-debates..

4. METHOD

Content analysis of articles published in Swedish and Polish press has been used in order to study the media debate on nanotechnology in these two countries. Two national broadsheets with the largest circulation from each country have been chosen for this research. The selected newspapers were: from Poland: *Gazeta Wyborcza* and *Rzeczpospolita*; from Sweden: *Dagens Nyheter* and *Svenska Dagbladet*. Since *Gazeta Wyborcza* distributes its local issues together with the national issue, the two largest (by circulation) Swedish local newspapers have been added to the corpora in order to achieve a balance between the Polish and Swedish sets of articles. The Swedish newspapers are *Sydsvenskan* (distributed in the South of Sweden) and *Göteborgs Posten* (distributed in Gothenburg-area). The timeline for the search for articles dealing with nanotechnology is a period between 1st January 2004 and 31st December 2009. Searches for relevant articles have been conducted using the newspapers’ own web-search engines as well as the Factiva database. After conducting preliminary searches, articles where nanotechnology did not play a prominent role, and advertisements and articles where “nano” was used as a part of a product name were excluded.

A total of 118 Polish and 66 Swedish articles have been selected for further analysis. Figure 1 presents more detailed information about the selected corpora.

Figure-1: Number of published articles in Sweden, 2004-2009



The selected articles were coded for the existing frames, themes, general tone, actors as well as “risks vs. benefits” focus. The coding scheme used is based on the coding schemes used in former studies on media debates on emerging technologies (Gorss and Lewenstein, 2005; Hibino and Nagata, 2006). The choice of frames was based on the framing typology adopted by Gorss and Lewenstein (2005). Apart from frames, coder was also looking for the themes used in the articles. While themes are strictly related to the content of the particular text (i.e. “what is the story about”), frames are giving information about the way this particular news is presented (i.e. “how is the story told”).

While coding, the coder could choose more than one frame, theme or actor although one frame/theme/actor was always distinguished as the main one. A sample of articles was coded by the author and two Swedish and Polish native speakers. After revising the coding scheme, all articles have been coded by the author.

5. RESULTS

The analysis of the corpora shows that both Polish and Swedish coverage of nanotechnology between 2004 and 2009 was rather positive. However, there is a difference in the proportions between positively and negatively framed articles. In Poland 81% of articles were positive, 13% were neutral and 6% were negative. In Sweden the general tone of the coverage was less positive – with 59% of articles having positive tone, 14% neutral and 27% of all articles having negative tone. A significant difference between Swedish and Polish coverage can be observed when looking at the changes across the time in the general tone of the press coverage of nanotechnology (see Figure 2 and Figure 3).

Figure-2: General tone of Swedish articles 2004-2009

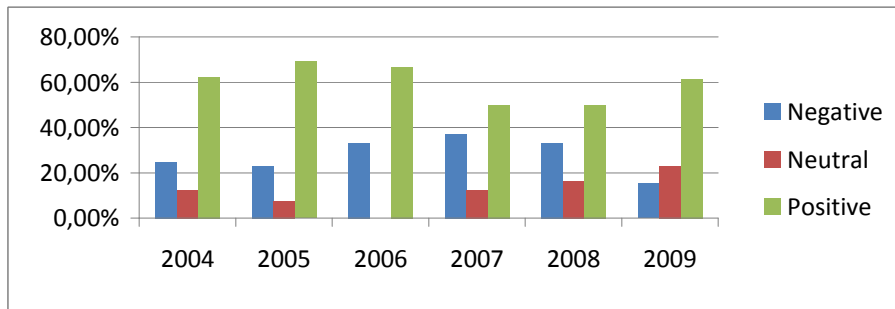
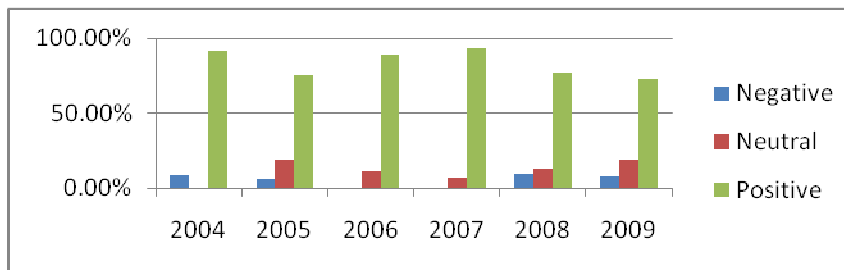


Figure-3: General tone of Polish articles 2004-2009



Data presented in figures 2 and 3 shows that unlike Polish coverage, where each year more than 73% of articles have a positive tone, the general tone of Swedish articles was changing between 2004 and 2009. The use of a negative tone started to rise in Swedish press in 2006 reaching its highest level in 2007 with almost 40% of the negative articles.

The dominance of the positive tone in Polish articles coincides with the fact that the Polish media debate on nanotechnology was mostly focused on the benefits of nanotechnology (83% of the coverage). The description of actual or potential benefits of nanotechnology has dominated also the Swedish debate although on a smaller scale (62% of articles) with higher percentage of articles discussing risks of nanotechnology (especially in 2007 and 2008). The only Polish article that was discussing only risks of nanotechnology was published in 2008. All other articles discussing risks of nanotechnology were presenting them along with the benefits. Nevertheless those articles never constituted more than 20% of the yearly coverage of nanotechnology in the studied Polish broadsheets.

The main benefits of nanotechnology mentioned in the articles are: new possibilities and higher effectiveness of processes in many areas of human activity. The industry that is most often mentioned in the context of

nanotechnological development is electronics, computing and telecommunication industry (new and more efficient materials, conductors, computers, mobile phones and batteries). Medicine is the second area that (according to Polish and Swedish press) may benefit most from the development of nanotechnology. This discussion included such issues as possible non-invasive surgery methods (e.g. nanobots), new ways of drug delivery as well as new cancer treatment methods. Nanotechnology is also often portrayed, especially in Swedish coverage as an “environmental-friendly” technology. This is an interesting example of a tendency to point out the same aspects or applications of nanotechnology as both beneficial and risk elements. The risks of nanotechnology are mostly described as “unknown” risks both for human health and the entire environment. In these discussions on risks and benefits of nanotechnology involves participation of different actors.

The analysis of the actors active in the media debate on nanotechnology in Poland shows that scientists were the most active group. Scientists were also the most popular actors in Swedish press, although they appear only in 34% of articles. Their voices were especially dominant between 2004 and 2006, as well as in 2009. It can be observed that scientists were less likely to be found as actors in articles that deal with risks of nanotechnology, especially in Sweden (however, the latter observation can be due to the lower number of risk-focused articles in Polish press). Questions of risks were usually raised by non-scientists – institution officials, politicians or NGO’s. However, they do not constitute the second most popular group that is active in the nano-debates in Sweden and Poland. The second group active in this debate are representatives of business, although they could be found only in 19% of Swedish and 14% of Polish articles.

Another difference between Polish and Swedish coverage is the role that Institution officials and Politicians play in the debate around nanotechnology. In Sweden they were (together with NGO’s) mostly active in the discussions around risks and safety of nanotechnology as well as the regulatory questions. However, in Poland Politicians and Institution Officials were not active at all in the debate around risks or regulation of nanotechnology. Polish institution officials appear only in three articles that discuss various practical applications of nanotechnology (the products of some local company or the use of nanotechnology in the process of preserving monuments). Politicians occur only twice in the Polish coverage and only one of them is a Polish politician (mayor of the city of Bialystok). Other politicians cited in an article on nanotechnology are Russian president and prime minister.

The study of themes that appear in the debates on nanotechnology involves the selection the main theme (one per each article) and additional sub-themes (more than one per article). Figures 4 and 5 deliver more information about the use of particular themes between 2004 and 2009.

Figure-4: Most popular themes in the Swedish press debate on nanotechnology

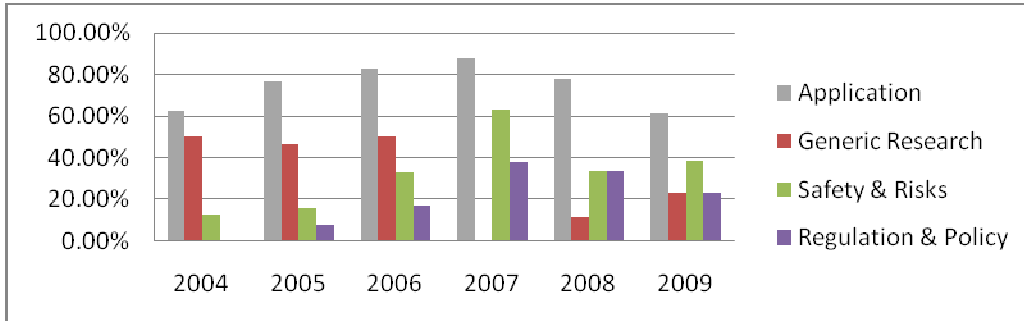
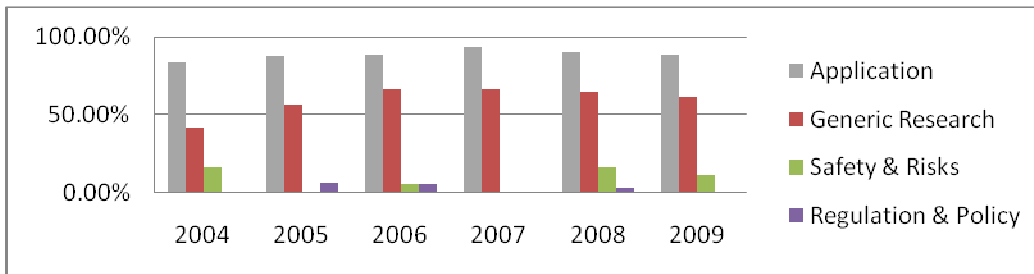


Figure-5: Most popular themes in the Polish press debate on nanotechnology



It can be observed that ‘Application’ was the most popular theme in both countries. Between 2004 and 2006 the Generic Research theme was also very popular in both countries. However, after 2006 the coverage in both countries went into two different directions. The Polish newspapers continued to be mostly focused on the two mentioned themes, while Swedish debate started to be more diverse in terms of discussed subject. From 2006 there was a steady rise in the use of such themes as “Safety and Risks” and “Policy and Regulation”. Journalists’ focus on these themes achieved a peak in 2007 and in the same year there were no articles discussing issues related to the generic research. While discussing Risks and Safety, authors usually referred to legal regulations and government’s policy towards nanotechnology, therefore “Policy and Regulation” was usually a secondary theme, while the main focus were safety issues. This theme became more popular in 2008 and 2009, while other themes started to be used less frequently (especially in 2008). In Poland the Application-theme dominated

across the coverage - each year this theme was used in ca. 87% of articles and the use of the Safety and Risk as well as the Regulation and Policy theme was rather limited in Polish press. This contrasts clearly with Sweden, where both the Safety and Risks and Regulation themes were used more often (20% of articles).

The study of the frames used in the debates on nanotechnology in Poland and Sweden shows that the most popular frame is “Progress”. This frame was popular both in Polish and Swedish press, although its use in Sweden varied across the time, while in Poland its “popularity” remained on approximately same level each year (see figures 6 and 7).

Figure-6: Most popular frames in the Swedish debate on nanotechnology

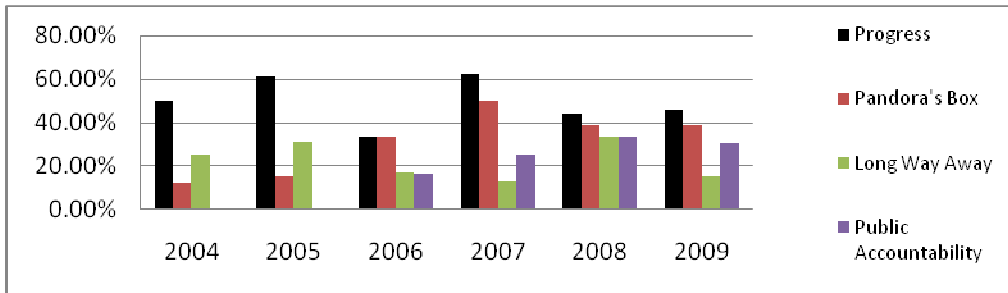
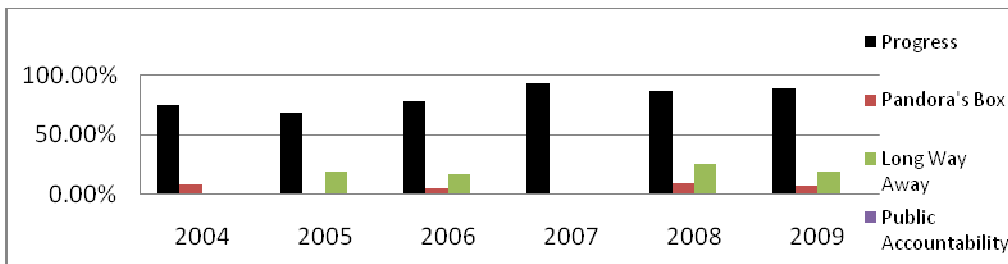


Figure-7: Most popular frames in the Polish debate on nanotechnology



As can be observed on the graphs there are various other differences between the ways debates are framed in Poland and Sweden. The Polish debate, in the same way as it is mostly focused on benefits of nanotechnology, its applications and nano-research, is mostly using progress frame. Each year it was used in more 75% of articles (93% in 2007). An article reporting a progress in nanotechnology was usually referring to achievements made by scientists.

The issues related to potential risks and threats of the new technology were framed with the “Runaway” or “Pandora’s Box”-frames, although Pandora’s Box frame was more popular in both countries. The Public Accountability –frame started to be used in Sweden in 2005 and since 2007 it started to be more popular

as dominant frame (30% of articles in 2008). In Poland this frame was not used at all. It can be also observed that the Economic Prospects and Long Way Away-frames were less popular in Poland. It has been observed in both countries, that the Long Way Away frame was usually not used together with Pandora's Box frame. It suggests that journalists wanted to highlight that the potential risks of nanotechnology "are already here".

6. DISCUSSION & CONCLUSIONS

The conducted analysis media debate on nanotechnology in Poland and Sweden shows that the press coverage of nanotechnology was mostly positive and focused on benefits of this technology. Similar pattern has been observed in other countries like USA, Netherlands, Germany, Canada and the UK. The "Progress" frame was the most popular in both countries and the "Pandora's Box" frame was the most often used in the discussion around potential risks of nanotechnology. In terms of most popular patterns (Application, Generic Research) or actors (Scientists) Swedish and Polish press is also following patterns that can be found in American, German or British press.

However, there are some differences – both between the analysed corpora and former research and within the corpora (i.e. between Swedish and Polish coverage). The proportions between the focus on risks and benefits as well as in the use of particular frames and themes, shows that the Swedish press is more critical towards nanotechnology than newspapers in other countries, especially the USA. Unlike US-press (Gorss and Lewenstein, 2005) Swedish newspapers were not often discussing the economic prospects related to nanotechnology. The Polish debate was not as diverse as in Sweden, since each year it was dominated usually by one frame (Progress), theme (Application) or actor (Scientists). The Polish coverage was overwhelmingly positive and focused mostly on the benefits of nanotechnology.

It can be stated that this study shows that in terms of tone of the articles as well as frames and themes used in the press coverage the debates in both countries are following patterns observed in other countries that have been studied in this context. The study also shows that the coverage in both countries confirms also the earlier research that points out the differences between European and US press debate on nanotechnology, i.e. a less positive tone in Europe and more focus on potential risks of nanotechnology. Considering the results of this research it can be stated that the later is relevant only for Swedish media, since the Polish articles were overwhelmingly positive and the discussion on risks about nanotechnology was rather limited. However, all former research on media debate on

nanotechnology in Europe was focused on Western-European countries only. Therefore it could be argued that the observations made by Gaskell et al. (2005) who argued that European media and Europeans are less enthusiastic about nanotechnology than US-media, may be relevant for Western Europe only, since Polish media tends to be following US-patterns. Nevertheless, such hypothesis can not be confirmed since there is a total lack of relevant research regarding media in other Central and Eastern European countries. Therefore, considering the results of this research, observations made by other researchers (Nisbet and Scheufele, 2009) as well as European Commission's recommendations (European Commission, 2010), further studies on this subject are needed in order to gain knowledge about representations of nanotechnology in different countries. Such knowledge is essential for informing the "unaware public" about nanotechnology as well as any other emerging technology.

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BIBLIOGRAPHY

Anderson, Alison, Stuart Allan, Alan Petersen and Clare Wilkinson (2005), "The framing of nanotechnologies in the British newspaper press", *Science Communication*, Vol. 27, No. 2, pp. 200-220

Arnaldi, Simone (2008), "Converging technologies in the Italian daily press 2002-2006: preliminary results of an ongoing research project", *Innovation: The European Journal of Social Science Research*, Vol. 21, No. 21, pp. 87-94.

Devereaux, Zachary, Andrei Mogoutov, Claude Theoret and Caroline Allard (2008), *Mapping Public Opinion and Discourse about Nanotechnology in Canada and OECD States, Data Analysis report - Phase II*. Toronto: University of Toronto.

European Commission (2010), *Communicating Nanotechnology*. European Commission: Brussels.

Faber, Brenton, Justin MacKinnon and Margaret Petroccine (2005), "Media portraits of nanotech in North American written media 1986-2000", *Nanotechnology Law and Review*, Vol. 2, No. 3.

Fitzgerald, Scott and Beth Rubin (2010), "Constructing Risk: Media Coverage of Nanotechnology", *Sociological Spectrum*, Vol. 30, No. 4, pp. 367-402.

Friedman, Sharon and Brenda Egolf (2005), "Nanotechnology: Risks and the Media", *IEEE Technology and Society Magazine*, Vol. 24, No. 4, pp. 5-11.

Gaskell, G, T Ten Eyck, J Jackson and G Veltri (2005) "Imagining nanotechnology: cultural support for technological innovation in Europe and the United States", *Public Understanding of Science*, Vol. 14, No. 1, pp. 81-90.

Gaskell, G, T Ten Eyck, J Jackson and G Veltri (2004), "Public attitudes to nanotechnology in Europe and the United States", *Nature Materials*, Vol. 3, No. 8, p. 496.

Gorss, Jason and Bruce Lewenstein (2005), The Saliency of Small: Nanotechnology Coverage in the American Press, 1986-2004", *International Communication Association*, pp. 1-22.

Grobe, Antje, Caspar Eberhard and Martin Hutterli (2005), Nanotechnologie im Spiegel der Medien: Medienanalyse zur Berichterstattung über Chancen und Risiken der Nanotechnologie. St.Gallen: Stiftung Risiko-Dialog.

Hibino, A, and M Nagata (2006), "Biotechnology in the Japanese media: Comparative analysis of newspaper articles on genetic engineering in Japan and Europe", *Asian Journal of Social Psychology*, Vol. 9, No. 1, pp. 12-23.

Kjærgaard, Rikke Schmidt (2008), "Making a small country count: nanotechnology in Danish newspapers from 1996 to 2006", *Public Understanding of Science*, Vol. 19, No. 1, pp. 80-97.

Kjølborg, Kamilla Lein (2009). "Representations of Nanotechnology in Norwegian Newspapers - Implications for Public Participation", *Nanoethics*, Vol. 3, pp. 61-72.

Kulve, Haico Te (2006), "Evolving Repertoires: Nanotechnology in Daily Newspapers in the Netherlands", *Science as Culture*, Vol. 15, No. 4, pp. 367-382.

Laing, Andrew (2005), A report on Canadian and American news media coverage of nanotechnology issues, Toronto: Cormex Research.

Nisbet, Matthew and Dietram Scheufele (2009), "What's next for Science Communication? Promising directions and lingering distractions", *American Journal of Botany*, Vol. 96, No. 10, pp. 1767-1778.

Stephens, Lowndes (2005), "News Narratives about Nano S&T in Major U.S. and Non-U.S. Newspapers", *Science Communication*, Vol. 27, pp. 175-199.

Wilkinson, Clare, Stuart Allan, Alison Anderson and Alan Petersen (2007), "From uncertainty to risk?: Scientific and news media portrayals of nanoparticle safety", *Health, Risk and Society*, Vol. 9, No. 2, pp. 145-157.

Zimmer, Rene, Hertel Rolf and Böhl Gaby-Fleur (2008), Risikowahrnehmung beim Thema Nanotechnologie – Analyse der Medienberichterstattung, Berlin: Bundesinstitut für Risikobewertung.