Marine Policy 76 (2017) 19–27

Contents lists available at ScienceDirect

Marine Policy

journal homepage: www.elsevier.com/locate/marpol

Media framing of aquaculture

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ARTICLE INFO

Keywords:
Aquaculture
Salmon
Media
Content analysis
Public opinion
Public regulation

ABSTRACT

Norway is the world's largest producer of farmed salmon. Aquaculture is the country's second largest export industry and thus vital for employment in coastal areas of Norway. The industry is dependent on public acceptance and good standing in local communities in order to gain access to new sites and to be able to sell its product. Public opinion (and assumptions about public opinion) on aquaculture may influence the industry's framework conditions and policy. Being located in coastal and rural areas, the industry must rely on the media to spread information to the public about the industry. Therefore, the media are an important source of information about farmed salmon, and the way the media present aquaculture issues has an impact on public opinion as well as authorities. This article examines how the aquaculture industry is portrayed in Norwegian newspapers and discusses how media topics and media framing may influence public opinion. The analysis shows that the most frequent topics covered in Norwegian newspapers are connected to the environment, aquaculture industry, and politics, where the concerns about the environment are dominant within the risk frame. The negative images portrayed by the media have a strong agenda-setting force and may skew public opinion to a narrow focus on environmental risks, influencing both the debate's content and the regulators' increased emphasis on environmental risks. This is strengthened further by the focus on sustainability, where the focus is solely on the dimension of environment, making other sustainability dimensions less prominent in the media coverage.

1. Introduction

"Four hostile newspapers are more to be feared than a thousand bayonets." – Napoléon Bonaparte [1], p. 11.

Norway is the world's largest producer of farmed Atlantic salmon (*Salmo salar*), and the aquaculture industry[1] is one of the largest export industries in the country. The industry is an important contributor of value creation and employment in the coastal areas of Norway. To maintain and increase current production levels, the industry is dependent on access to favorable production sites. Local communities are first-line gatekeepers approving or denying access to sites in local coastal waters, and public acceptance and good standing in local communities therefore is important. The industry also is dependent on its image or reputation, as represented in news media and manifested in the general public opinion (national and worldwide) to be able to market and sell its product. Furthermore, media coverage and public opinion on aquaculture may influence politicians and regulatory authorities, impacting on the industry's framework conditions as conditioned by a supportive governance system.

Public opinion is a challenging object to study. In relation to aquaculture, however, media representations have been used to study public perception and to uncover different media framings [2–5]. On the relatively specialized topic of aquaculture, it is useful to know what information is available to the public. Understanding the content of newspaper articles cannot inform us about people's view on aquaculture, but it can provide an idea of the issues people may think about when considering the aquaculture industry. In the case of aquaculture, this does not suggest that the media have the impact to tell people exactly *what to think*, but the media can be quite successful in telling the people *what to think about*. When it comes to fish farming in Norway, the media's issue agenda (what issues are put on the agenda) and coverage (how they report on these issues) of aquaculture industry is central in informing the public of prominent issues and debates. This is strengthened further by the fact that most people do not have the opportunity to learn about aquaculture from firsthand experience because the industry is located in rural areas with production out in

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[1] The focus in this article is limited to the Norwegian salmon farming industry/aquaculture industry producing salmon. Both aquaculture and fish farming are concepts used interchangeably in the current literature, and this article will continue using both concepts, however, focusing solely on the production of salmon.

http://dx.doi.org/10.1016/j.marpol.2016.11.013
Received 5 July 2016; Received in revised form 2 November 2016; Accepted 2 November 2016

open waters.

Mass media plays a key role in structuring and dominating the public sphere and is one of the most used and preferred information sources as well as being characterized as the “watch dog” or the “fourth power” of government [6,7]. Media information related to farmed salmon, such as food health issues, can influence public opinion and consumers’ decisions and perception with respect to the aquaculture industry [8]. There are several examples of media controversy over foods, and farmed salmon is no exception [4,9,10]. Consumers are exposed to numerous, and often contradictory, messages with respect to issues such as food safety and environmental conflicts. Competing claims can put consumers in difficult positions when weighing risks and benefits of aquaculture production [11], and there are concerns about the mass media's role as “meaning-makers” [12,13]. A demonstration of the media's influence on people's perception is the media storm that erupted after a research study stated that farmed salmon contained more health-threatening pollutants than wild salmon. This had an immediate impact in the media, in addition to impact on the public. Later, however, experts reached different conclusions (due to differences in choices of data), but these results were not as publicized as those from the other study [9,14]. This demonstrates the power of what Flyvbjerg [7] describes as tension points, meaning points of potential conflict, that are particularly interesting to the public and media. Tension points are of great interest to media as these conflicts tend to make good stories when focusing on power and dubious practices.

In addition to public opinion and perception of the aquaculture industry, citizens’ political priorities can be determined by media agendas and this has ramifications [15]. If people believe the industry has negative impacts on the environment and human health, the public will demand a better regulated industry (e.g., citizens would want politicians to act upon these issues, or in other words, control the industry better). The media coverage of an issue therefore may have an impact on the public's demand for (politically) solving an issue. The media also are involved in indirect attempts to influence policy [16]. Goldenberg, cited in Ashmoore, Evensen, Clarke, Krakower, and Simon [1], p. 239, said, “Through the media, issues are frequently brought to the attention of the public and governmental officials.” News coverage is used for many purposes, and to gain a hearing in the political process and attain the political agenda is one of them. In such ways the media are the key access point to public officials for all (interest) groups. It is recognized that media agenda is the journalists and newspapers way to inject their voices into the news, although the media agenda itself is also a subject influenced by politicians, government officials, stakeholders, the public, and scientists attempting to shape or manipulate the media [7,17]. On the other hand, the market also creates a tension between media civic responsibilities and media profit motive. As a result of this tension the media could be forced to value audience size over news content, resulting in content that sells rather than content that informs [17]. Influences from the market as well as from various stakeholders are important in shaping the media agenda. However, within the scope of this article the media content is seen as an expression of media agenda, independent from various stakeholder agendas and their possible influence on media.

Newspaper articles from nine newspapers in 2012–2014 were examined and the content analyses show how the media represent salmon aquaculture and how this coverage potentially could influence the public. This study focuses on the information made available to the public as a signal of what the public might think about aquaculture; the design of the study and the dataset is able only to suggest potential rather than real/demonstrated media effects on public opinion. On the basis of previous studies documenting how media affect opinion, however, this paper examines how media coverage can potentially shape public opinion related to Norwegian aquaculture in “an era in which the media have become such a crucial dimension of the political game” [13]. In this study, the focus is on how the news media in Norway inform the public on the aquaculture industry and the issues connected with salmon farming. How is public opinion subject to media framing and agenda setting? What are the prominent topics, frames, and positions in the media coverage of Norwegian aquaculture industry, and what can we infer on the impact on public opinion?

This paper is structured as follows: after a brief introduction, Section 2 elaborates the ongoing debates on aquaculture and the challenges facing the industry. Section 3 presents how the media influence both public opinion and government management of the aquaculture industry. In this section, the concepts of discourse, agenda setting, and framing are elaborated. Methods and materials are outlined in Section 4, while results and discussion of media coverage is presented in Section 5. Conclusions are in the final section.

2. Aquaculture in Norway and ongoing debates

With the development of modern aquaculture, and salmon aquaculture in particular, a range of controversial issues has emerged. Aquaculture is seen as both the most promising and the most controversial new industry [11]. In the debate on aquaculture, there are several master themes, and the controversy on aquaculture is complex and multidimensional, facing competing claims from a range of different actors. However, one can observe a pattern revolving around issues connected to environment, human health, rights, and rural development [11].

In Norway, fish farming has been a recurring topic of debate. Interestingly, although salmon as a product has a fairly good reputation, the aquaculture industry for several years has struggled with bad publicity and a poor reputation [18]. The ongoing debates are marked by concerns about the sustainability of the aquaculture industry and in particular the environmental sustainability. Aquaculture is related to a range of environmental risks, such as negative impacts on biodiversity, fish escapes, and challenges with salmon lice and lice treatments. In addition, the industry faces other challenges (e.g., availability of suitable locations, concerns for fish welfare, and use of fish-based feed). To be able to grow and to maintain its position as a major player in global food production, the industry needs to foster a favorable public image [2,3] and is dependent on broad public acceptance. Such acceptance and a positive public opinion, in turn, will affect the industry's critical framework conditions such as access to suitable and productive sites, predictable rules and regulations, room for innovation, access to markets, and favorable logistics.

3. Media and public opinions role in shaping aquaculture regulation and reputation

It is evident that the media have an impact on public opinion [3,19,20], but the degree of media influence remains a matter of debate and uncertainty. The media are an important part of people's news information, and citizens are highly dependent upon the media for public affairs information [15,16]. Political knowledge and images of our modern society (our reality) are created primarily through individual contact with the media rather than direct experience, and we live in what Johnson-Cartee [16] calls a mass-mediated reality. We construct meaning in a process often dominated by the mass media, and the media work hard to ensure that the public understand the content by delivering sharp and simple stories, along with pictures to present a strong visual impact [21]. Traditionally, the effect of mass media influence can be divided into two levels: micro-effects, or those effects related to an individual, and macro-effects, those effects related to society at large. Micro-effects can be seen as influences on an individual's knowledge, actions, or emotional responses to what is known, while macro-effects can be seen as influences that either maintain existing structures and behaviors in society or allow society to change or evolve [16].

Media coverage influences public perception and subsequent con-

sumer behavior. Schlag [3] used media representations as a proxy for public opinion and studied how risks and benefits of aquaculture are portrayed in media in different countries.[2] Many factors in the fish farming debate have been identified in the risk perception literature as causing public concern and controversy. Because the media are believed to reflect and shape public opinion, their influence is also a major premise for the legitimation of political decision-making. To a significant degree, politics as well as individuals are shaped by the news media's selection and presentation of news stories. Media images become the reality on which many people in and out of government base their judgments [16].

Reputation and trust in the aquaculture industry (as reflected in public opinion) are dependent on whether the public believes governmental agencies are capable of controlling the industry in a sound and rational manner. In response to widely publicized risks (e.g., food risks, food scares), public trust has proven unstable [14]. Studies have shown that the dominant message concerning aquaculture is negative, and people often have felt manipulated and misinformed. In addition, results have shown that people felt "aquaculture was currently under no one's control and fast moving past the point where it can be controlled" [2], p. 838, also stating there was little knowledge of and trust in the regulatory risks and standards. The rationality of politicians can be understood in three different aspects, all possibly subject to influence from media and the political ramifications of public opinion. First, for officials of governing parties, re-election is paramount and responding to demands from public opinion could be vital for such re-election. In addition, governing parties will seek to be perceived as competent while holding office and policymaking should be in accordance with public opinion, preferably without substantial amounts of criticism (or distrust). Finally, political signals and media coverage also may influence the non-elected regulative bodies of the industry, whose decisions also create vital inputs to the industry's reputation. In addition, over the years several Norwegian politicians and government officials have been stakeholders in Norwegian salmon farming companies. This has resulted in media debates questioning the impact of their dual roles, self-interest versus competence, and industry influence on regulation. On one hand, ministers could be perceived as competent and well-equipped to govern the aquaculture industry, while, on the other hand, it could be perceived challenging with politicians regulating an industry where they have a personal gain of industry growth and favorable framework conditions.

Through time politicians have attempted to regulate the industry both by the means of detailed laws and regulations covering all aspects of production and by a complex system of licenses. The latter especially has been used to express various cabinets' political priorities, such as slaughter structure, gender issues, and recently environmental concerns. Different regulations over time have played a significant role in the industry's development and its impact on the environment [22,23]. In recent years, regulation of Norwegian aquaculture has been connected to an overall focus on the three well-known dimensions of sustainability: economy, environment, and social factors [24,25]. It is the dimension of environment, however, that has been in the foreground, leaving social and economic factors less prioritized.

3.1. Aquaculture discourses

In this paper, the concept of discourse is seen as a mapping of dominant frames of reference, or ideas that might be decisive for how the opinion of the public, including authorities and experts, relate to issues connected to aquaculture [26]. Discourses can be seen as frameworks for interpretation formed by dynamic processes that change and form our perception of reality. We have different ways to speak about and understand the world, and how we describe "reality" is based on shared ideas and explanations.

In the words of Foucault, discourse refers to "ways of constituting knowledge, together with the social practices, forms of subjectivity and power relations, which inhere such knowledges and relations between them. Discourses are more than ways of thinking and producing meaning" (Weedon as cited in Røyrvik, Aasen, and Olsen [26], p. 108). In this paper, media discourses should be seen as structures that define what kind of topics can be discussed, how topics can be discussed, and which participants have access to discussing them in the public media forum. Our analysis focuses on the discourses in the media instead of discourses of the general public. Understanding media discourses is of upmost importance in relation to political priorities as this gives an image of how the public and electors think about and discuss chosen topics (e.g., aquaculture) [27]. The visible public are those who have access to the media discourse [28] and these representations of the (visible) public are accessible to the government [26].

How different discourses are shaped and how they appear and disappear is, in this study, not only related to the topics and actors giving access to the media debate, but also the media's agenda-setting power and framing.

3.2. Media agenda setting and framing

One of the founding fathers of the concept of *agenda setting*, McCombs [29], p. 1, explained media influence on public opinion like this: "Through their day by day selection and display of the news, editors and news directors focus our attention and influence our perceptions of what are the most important issues of the day." The concept of agenda setting refers to how the media may set the "agenda," giving certain issues differential attention and thereby setting the agenda for public discourse [17,30]. Which issues people view as important is influenced by media when some issues are covered and others are ignored [17], p. 244. The news media provide us with information, and how this information is provided plays a key role in our construction of reality. The public will regard those issues emphasized in the news over time as important and as a consequence, the media agenda sets the public agenda [15,17,29]. At the same time, when media omit specific issues and debates, this is also a part of the media agenda.

Whereas agenda setting is focusing on how some issues are put on the agenda, *framing* refers to how the media may highlight some aspects of an issue and ignore others, and by doing so may promote a particular problem definition, moral evaluation, causal interpretation, and/or treatment recommendation for the item described [17,29]. A frame has been defined to suggest the essence of the issue and what the controversy is about, like "a central organizing idea or story line that provides meaning to an unfolding strip of events" (Gamson and Modigliani as cited in Scheufele and Iyengar [31], p. 143. Frames can be an outcome of journalists' packaging of information for the audiences in such a manner that they quickly identify and classify the information. When talking about a subject, such as aquaculture, framing can be seen as "the selection of – and emphasis upon – particular attributes for the media agenda" [29], p. 87. Previous studies have shown that framing emphasizing positive consequences or gains has less persuasive impact than framing in terms of negative consequences [16]. In addition, the media often frame responsibility connected to the issues put on the media agenda.

4. Materials and methods

The research questions will be examined through analyses of

[2] Schlag [3] studied how the media present risks and benefits related to aquaculture and fish consumption in different countries, showing differences in what types of risks the media focus on. For instance, in Norway the media focused more on risks then benefits and mainly risks connected to the environment, while in other countries, the focus on human health risks (when consuming aquaculture products) was larger than other risks.

newspaper articles. This is done through content analysis, which is a research method with several possible approaches. The common ground is the aim to extract meaning from the content of text (e.g., a newspaper article) to understand what the text conveys and what the text means to the audience [32,33]. A content analysis approach to media representations of aquaculture provides us with insight about the types of representations available for expressions of public opinion.

This study is in line with what Hsieh and Shannon [32] call a summative content analysis approach, which involves counting and comparisons of content, followed by interpretation of the underlying context. Such an approach often is used to explore content (i.e., what types of news are being reported and to what extent), but the analysis also goes beyond word counts to include an interpretation of content [32]. This interpretation serves not only to sort news articles within a scheme of categories, but also to enable the analysis of the overall impression of the media coverage "beyond the numbers." The influence between media and public opinion, and the subsequent linkages between the media, public, and government/regulatory bodies do not constitute a one-to-one causal relationship as there are multiple interactions as well as feedback loops.

4.1. Sample selection and coding

The data collection and analysis were conducted in several stages. The study includes articles from nine (national, regional and local) newspapers in 2012–2014. National newspapers were chosen based on geography and relevance in covering several areas where aquaculture is present. The national newspapers differ in their political profile. *Dagens Næringsliv* is focused on industry, economy, and stock exchange, *Klassekampen* is a left-wing newspaper with a socialist profile, and *Dagbladet* is a popularized liberal newspaper in Norway. The regional newspapers represent the western, middle, and northern part of Norway—geographical areas with aquaculture. The selected local newspapers represent municipalities with a strong presence of aquaculture industry. In sum, these newspapers cover the breadth of aquaculture issues and diversity in their circle of readers (the public). Industry specific newspapers are not included in this material as these are not aimed towards the general public. Newspaper articles were gathered through the database Retriever A-tekst,[3] based on selected aquaculture search words.[4]

All articles were downloaded and sorted by newspaper and year. The research team read all articles for analysis and coding. The coding scheme (see Appendix) was based on the research questions in the overall research project, focusing on the industry's reputation and its influence on governmental regulations, as well as on discussion among participants in the research group. The scheme also included an open comment field to be used for additional information for further analyses in the overall research project.

The aim of the content analysis was to classify the newspaper coverage according to topics and issues in the media; sources used (and actors given access to the debate); possible media events; the impression conveyed by the article concerning benefits or risks; the importance of environmental, economic or health issues; and what positions (explicitly/implicitly positive/negative) appear in the articles. In addition, the overall impression of the media coverage of aquaculture was investigated. In the mapping of media content, the important structural conditions such as dominant arguments and topics, participants, and media discourses were emphasized. Frames were used as a coding variable, searching for the overall impression of each article's content. All articles were coded into either a framing of benefit (this has a value), risks (this produces a risk), or none (no overall framing in either direction).

Table 1
Newspaper distribution and characteristics.

Newspaper	Geographical area/political profile	Circulation numbers (2014)	Total articles included	Articles per year
Dagbladet	National, popularized and more liberal profile	73,642 / 73,642	17	1/14/2
Dagens Næringsliv	National, business-oriented profile	69,916 / 79,637	240	57/91/92
Klassekampen	National, political, left-wing and socialist profile	19,025 / 19,253	39	4/26/9
Adresseavisen	Regional – middle part of Norway	61,086 / 63,981	123	34/38/51
Bergens Tidende	Regional – western part of Norway	70,209 / 73,640	133	35/50/48
Nordlys	Regional – northern part of Norway	18,903 / 20,555	100	19/33/48
Lokalavisa Nord-Salten	Local – Nordland	2,771 / 2,789	13	0/6/7
Sunnmørsposten	Local – Møre and Romsdal/Sogn and Fjordane	24,875 / 24,596	117	27/44/46
Finnmarken	Local – Finnmark	4,903 / 5,492	45	10/15/20

After reviewing all articles manually and removing those that were not relevant (e.g., recipes, Twitter quotes), the final database summed to 1,304 articles. Of these, there were 204 small notes (e.g., fact boxes, announcements, small notes from the national news agency, NTB), 827 newspaper articles, and 273 debate contributions. The following analysis encompasses the 827 articles and excludes small notes and debate contributions. The small notes were excluded because of their size and lack of meaning content (for analysis), while the debate contributions were left out due to their specific character as articles written by people other than the newspaper's editorial staff.[5] Table 1 presents a summary of the newspapers' characteristics[6] and articles included in the study.

5. Results and discussion

5.1. Topics in media and coverage over time

Overall, three topics dominated the media coverage across all nine newspapers as well as every year included in the study. The dominating topics in the Norwegian media were industry (with 271 articles), politics (203 articles) and environment (194 articles). Articles within the topic of industry typically dealt with industrial and economical information related to the industry as an economic sector, employer, etc. Articles containing information or debate about political events,

[3] A-tekst is a database that provides access to articles in Norwegian newspapers, searching for words in text, divided by newspaper and year. All articles from the search were collected in portable document format (PDF) files showing the text and, in most cases, a print of the newspaper page including pictures, headlines etc. Presented this way, it is possible to see the size of the article, its position in the newspaper, and pictures attached to the article (e.g., how the content is presented to the readers).

[4] The search in the A-tekst database was limited to articles containing one or more of these words (originally in Norwegian): farming, aquaculture, farmed salmon, aquaculture industry. To limit the results, articles with the search words and one or many of these following words: fur farming, fur animals, cod, turkey, birds, horse, seashells, cross words, recipe, was removed)

[5] The debate contributions were sorted in a separate analysis [34].

[6] Circulation numbers are numbers for the printed version and the total numbers including the digital version (if available) approved by a new counting method applied from 2014. It is important to note that circulation numbers do not equal reading or use. Downloaded from Dagens Næringsliv [35].

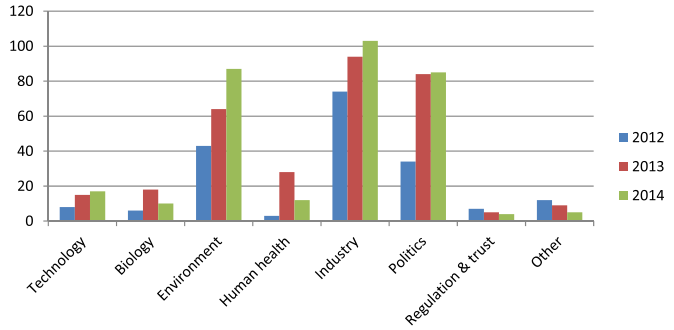

Fig. 1. Topic distributed per year (frequencies, n =827).

documents or announcements connected to the industry were categorized within the topic of politics (whereas regulation is more about the issue of trust in regulations and possible violations of this trust). Articles on environment dealt with environmental issues connected to aquaculture production and covered a range of areas, such as ecological consequences, contamination, etc. Fig. 1 shows an outline of the different topics and media coverage per year.

Industry being the dominating topic is not surprising as the industry and aquaculture companies are a regular part of the newspapers' business section. A large number of the articles within this topic was related to information from or about aquaculture companies, salmon prices, export information, tax reports, financial reports, etc. These articles mainly have an informative approach and can be seen as part of a discourse on aquaculture as an export industry that has a substantial economic importance for something/someone (e.g., specific company, Norway as a country). Articles often were on a national level, but there also was a substantial number of articles focusing on economic reports on a more local and regional level (e.g., covering the impact of the important corner stone company).

Since aquaculture is an important topic on the political agenda, media coverage of aquaculture industry and politics is not a surprising combination. In addition, within the time frame of this study, some political events were highly visible across the three dominating topics and thus specifically influenced the number of articles with politics as a main topic. One of the political events was the announcement of the so-called green licenses, 45 new licenses with strong restrictions to amounts of lice, lice treatments and use of new technology for a more sustainable production. Announcements of these licenses and the award process were found in many articles with a political perspective, as well as articles with industrial or environmental perspectives. Although technology was mentioned in a small number of these newspaper articles they rarely discussed benefits and/or challenges with different technological solutions, the pace of innovation in the industry, or the consequences of different technology being used by the industry today. Rather, technology was mentioned in relation to what types of technological innovation the companies presented in applications for green licenses, or in articles that discussed whether the government should command the industry to choose one technological solution over the other. The main topic in these articles were nonetheless of a political character and therefore sorted into this category.

Within the theme of politics, there were also a substantial number of articles debating governmental ownership and the sale of EWOS and Cermaq. The sale of Cermaq is different from reports and information about sales of companies because Cermaq (at the time) was partly owned by the government and Norway has a long tradition for different government-owned companies. The debate had several sub-topics: should the government sell the company or should it remain as main-owner? If sell, should Marine Harvest be allowed to buy it? And when it became public that Mitsubishi Corporation wanted to buy Cermaq, the debate turned to questions concerning the consequences for the company, and for the industry, if Cermaq was to get a foreign owner. However, the topic of Cermaq and consequences of foreign ownership disappeared from the media picture after the political decision was made (fall 2014). The announcement of a new white paper concerning new models for growth (and possible reductions) in the aquaculture industry dominated the articles on politics in 2013–2014. From this point in time the topics of politics and environment also were interwoven through the concept (and use of the term) *sustainability* where the environmental challenges was the most prominent issue in the debates. The articles on politics were seen as partly informative, especially when reporting on news from the government and important political documents about to be released; however, when the topic on growth and sustainability escalated, political articles became more divided between information/reports and debate, with the latter questioning the industry and its consequences, and how these could be managed through regulation and political decisions.

A large part of the environmental articles were concerned with the industry's environmental challenges, their consequences and how these challenges could or should be managed. These articles often states there is a problem, it is caused by something or someone, and sometimes the article presents a desired solution which often involves a change in regulations to forbid or change the industry practice. There is a range of environmental challenges in aquaculture; however, the media focus were mainly concentrated on issues connected to lice (and treatment), dissemination of diseases and aquaculture production as a general threat to wild fish and wildlife. These articles were more sensational in form and presentation (larger headlines, celebrities as front figures and the use of photographs, stronger adjectives and more colorful language) compared to articles on other dominating topics. The media coverage of environmental issues seemed to highlight risks and negative events. As already mentioned, the focus on sustainability was present, but both governmental representatives and stakeholders (including newspaper journalists) mainly focused on the environmental dimension of sustainability and as a result the economic and social dimensions were rarely part of the debate about sustainable aquaculture production. The lack of focus on other sustainability dimensions is particularly visible in newspaper articles presenting sustainability as a political vision and the pivotal factor for future growth. In addition, within the environmental dimension the issues highlighted in the media are mainly issues with sea lice, sea lice treatments, escapes and diseases. The media also omits environmental issues, as there are few articles covering challenges with fish feed (such as the need for wild-catch and potential for depleting some fish species, and the amount of vegetable omega-3 sources), GMO, emissions, and the recent focus on certification schemes for sustainable aquaculture. Environmental issues could also stand in competition to each other, as well as having conflicting consequences (e.g. high level of sea lice could impact wild salmon, while sea lice treatments could impact other species and environment conditions). Such conflicting issues were seldom present in the material in this study.

Moreover, one of the findings was that the debate on environmental challenges in aquaculture production became fused into an extensive, already existing, environmental discourse involving a global concern for environmental challenges that goes across industries, as outlined by Adger, Benjaminsen, Brown and Svarstad [36]. Aquaculture as an industry was seen as a threat to the (already endangered) environment on a local and national level (focusing on lice, diseases, wild salmon in rivers nearby, emissions), as well as on a global level, placing the industry together with other threats and demanding change on behalf of humankind (as a representative for *our* environment and owner of the common resources being used to farm salmon). This connection between environment and risk is in line with Beck [37], Hajer [38], Strydom [39] and their work on risk, construction of risk and its effects on society. A wide-ranging discourse that is concerned with risks and global environmental problems has emerged and still figures strongly in current debates [39]. In the risk society, as described by Beck [37] risks connected to environment stand out. Related to salmon farming

the environmental challenges, such as sea lice and diseases, represent harmful aspects of aquaculture that threatens the environment and its sustainability. The media (when mediating meanings from different actors) and the public (when accepting or rejecting these meanings) both have considerable power when generating public discourses and, when doing so, socially constructs, or negotiates, reality. When environmental issues within aquaculture are connected with global environmental discourses the perception of aquaculture and its consequences might be influenced to a greater extent by this constructed reality rather than actual or experienced reality. Overall, the aquaculture industry is definitely on the media agenda, but the most prominent topics in Norway are partly contrary to media coverage from other countries where coverage is more concerned about human health and risks connected to consumption of aquaculture products, although, in many cases, this is related to food scares and challenges with food safety and food quality [3]. Such food scares have not been present in Norway in the same way as they have been in countries such as the United Kingdom, and this could be a possible explanation of why this is not as prominent in Norwegian media compared to media in other countries. However, when some topics are omitted from the media coverage this is also a part of the media agenda setting and framing.

In addition, it is somewhat surprising that there is a lack of technology-focused articles since the industry has a strong reputation of being innovative, with a rapid technology development [23]. Although there were not many texts focusing mainly on technology, technology is mentioned in several articles where the focus was on one of the dominating topics (e.g., in relation to possible technological solutions within the new green licenses). The articles on technology often focused on (new) technology as a possible solution to existing challenges.

5.2. Differences between the newspapers

Although the topics described previously dominated across all newspapers, there were some differences among the newspapers as well. In the more political-oriented newspaper, *Klassekampen*, there was an overwhelming amount of articles focusing on politics as an overall topic. This is also the case for two local newspapers, which had debates and reports on governmental ownership of Cermaq and the green licenses frequently on the agenda. This is likely due to Cermaq's relevance for the specific geographical area for these newspapers, whereas the third local newspaper lacks the presence of this specific company in its area and probably would not put this topic high on the agenda. The only tabloid newspaper in our selection is the newspaper that was most occupied with the aspect of human health and consumption of aquaculture products. On the topic of industry it is clear that the business-oriented newspaper was the one reporting on this topic most frequently.

In terms of discrepancies, it was anticipated that there would be differences, especially due to the selection, which intentionally should represent different types of newspapers. The three national newspapers were fairly divided in topics as well as number of articles (agenda). On the other hand, the three regional papers were much alike in their coverage of aquaculture topics and number of articles. This suggests that different political profiles could affect how different topics are covered in the media, while regional papers (without specific profiles other than to cover news in their geographic area) show a similar coverage of aquaculture across the different regions of Norway.

5.3. Types of discourses, frames (risks/benefits) and positions

The articles were coded in frames to search for an overall impression of the articles. A benefit frame suggests that the content gives an impression that aquaculture (or the sub-theme within the aquaculture topic) has a value (e.g., export reporting which is good both for the company and for Norway). A benefit framing could also suggest solutions to challenges, with the article's main focus not on the specific challenges, but on how these could be solved. In contrast, a risk framing gives the impression that the subject covered produces a risk. This would be framed as more problem oriented and give an impression that although this risk should be managed or solved in some way, the risk is the main focus. The overall results show that there were more articles framed as benefits (360) than risks (278). But, the topics covered are not evenly distributed between the two frames, as shown in Fig. 2.

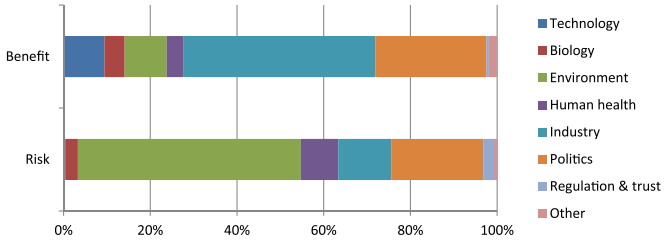

Fig. 2. Topic distributed per risk/benefit frame (frequencies, risk n =278, benefit n =360).

The three dominating topics in the overall media coverage also dominated the two frames. Within the benefit frame, articles with the topic of industry dominated with 44% of all articles. Articles focusing on politics amounted to 25%, while articles with an environmental focus represented only 5%. On the other side, articles focused on environmental issues dominated the risk frame with 51%. As with the benefit frame, articles with a political topic were the second largest, with 21%, and articles on industry stood for 12%. The topic of human health more often was framed as risk (9%) than benefit (4%), while technology was almost non-existent in the risk frame (0.4% versus 9.4% in the benefit frame).

The results on benefit and risk framing were closely linked to the discourses seen in the data. Articles on industry reported results connected to aquaculture companies, export, economics, etc., where the focus was on (produced) values. Within politics there were many discussions about state ownership of EWOS and Cermaq, as well as the new models for regulation and growth in the industry. Many of these texts reported or informed the public of political documents and events. There were also, however, several texts in which the media questioned these and other topics within politics, and there were different dynamics in terms of how newspapers portrayed these political events. While the debate on sale and state ownership of Cermaq more or less disappeared from the media picture after political decision was made, this was not the case for the debate on new models for growth in the aquaculture industry. Although this began with the political documents and politicians pushing the issue (political agenda) into the media agenda, the debate evolved and merged with existing debates on environment and risks, and was driven forward from the media even after the political decision had been made. The environmental debate consists of many risks and many issues portrayed on both local and national level. It is likely that even though some of these may be solved on some levels, the topic of environmental risks is so multitudinous that this debate is likely to persist over time.

This study did not focus on the overall discourses seen in aquaculture[7]; however, a relation between the different topics, their framing and previous studied discourses is found. The topic of industry is related to a discourse of an industry sector, which produces something of value for someone, while the discourse of environment is debating the industry as a producer of risks on a local and global level. Previous studies [18,40,41] have searched for the different discourses

[7] Døving [40] found several discourses on fish (e.g., industry, hunting, gourmet, health). These discourses were later partly updated by Guldseth [18] and Larsson [41], and new discourses (e.g. the sustainability discourse) evolved after 1997.

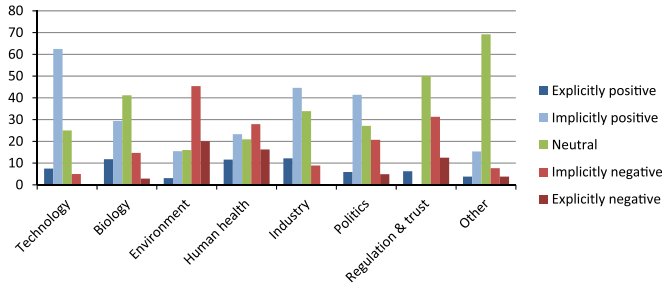

Fig. 3. Topic distributed per category of position (percentage, n =827).

for fish and salmon and found discourses that are similar to the dominating topics in our study. For example, they found discourses on industry and the environment (later on referred to as a part of the sustainability discourse). Although the findings resonate with these previously identified discourses, it was not searched for specific discourses in this study. Our method and the purpose of our research project was aimed at mapping the media coverage within the chosen time frame, not to replicate previous studies or search for long-lasting discourses.

The different framing was also related to the positions (explicitly/implicitly positive, neutral or explicitly/implicitly negative) found in the articles. There are some differences, however, in the positions' strength. News articles on industry most often were implicitly positive (almost 45%) or neutral (34%), as was also the case for technology and biology. Articles on politics were also often implicitly positive (41%) or neutral (27%), but 20% were also implicitly negative. The implied positive/negative position reflects that although it was not a clearly stated position, the article gave an overall impression of a positive or negative standing towards the debated aquaculture topic.

As shown in Fig. 3, articles about environmental issues stand out with an overweight of implicitly negative positions (45%) and explicitly negative positions (20%). This gives the impression that articles covering environmental issues might advocate a stronger impact of the risks portrayed. No other topic had this high of a percentage of clearly stated position, either positive or negative. When debating environmental issues it seems to be legitimate to take an unconditional position, a clearly stated position instead of a middle ground positioning.

These findings can be seen in connection with what Johnson-Cartee [16] describes as an era in which the media desire to attract consumers by preferring conflict over success (e.g., by sensationalizing problems). The focus on the environment and risks is overall more prominent than business news and political information. Often the public has a poor knowledge and understanding of basic economic concepts, and economic information can be very abstract and difficult to comprehend by large segments of the population, even in its popularized form [16]. In extension of this, the same argument could be valid for journalists working within a range of topics and industries; the technological innovations, operations and business-related issues within the aquaculture industry is complex and challenging to investigate, gain knowledge of, and further turn into popularized news articles for the public. An assumption can be made that the news stories on industry and politics are for those with a high interest in such aquaculture news, while news stories on the environment and aquaculture are more relevant for the general public connecting an overall discourse on environmental challenges with aquaculture industry. This argument is strengthened further by the risk framing in this topic. Negative information tends to influence people more than positive information; negative information is easier to remember and more persuasive[8] [16]. The dominant negative media coverage focusing on environmental risks increases public concern about these issues and ultimately produces poorer evaluations or more negative evaluations of the industry as well as the governmental authorities regulating it.

6. Conclusions

The aquaculture industry is definitely on the agenda in newspaper media, and this is driven by both the media agenda and the political agenda (such as new political documents, changes in regulation and political decisions). The attention of both media and politicians is drawn towards environmental issues, and while the environmental challenges connected to aquaculture is acknowledged, the findings show that environmental issues are overemphasized. As a consequence, other issues are sacrificed, as well as other, less prominent and possible conflicting, environmental issues. During 2012–2014, the dominating topics were politics, industry and environment.

Although these are quite evenly distributed between risk and benefits, the topics of politics and industry often were portrayed in a more informative matter, reporting on day-to-day changes in export, price, market, and political decisions and topics related to the industry. In contrast, media coverage of environmental issues was presented in a more sensational manner through larger headlines, photographs, stronger adjectives and more colorful language, and it was connected to a risk framing. It is difficult to assert whether this is specific to the aquaculture industry as the material in this study does not provide basis for comparison between the aquaculture industry and other industries, however, to investigate whether risks of salmon farming is treated by the mass media as higher than risks of other industries would make for an interesting avenue for future studies.

When the media give risks more prominent coverage than benefits, this will affect the opinions about and acceptance of the aquaculture industry as the media create and recreate a negative risk perception. One may infer that these risks have a bigger possible impact on readers. Another point to be made is that this study focuses on the impressions and portrayals made in news articles and not whether the coverage correctly represents all issues connected to salmon farming. One may argue that the negativity bias in news articles on the environment exists because there in fact is more negative to write about environmental issues than other issues. However, as shown above, articles about environment were more sensational in form an presentation, and seemed to highlight risks and negative events. On the other hand, the market, however, does not seem affected by the negative media coverage, as the demand for salmon products has increased the past years and the industry is more profitable than ever.

In the news media, the dimension of environment is amplified and connected to a wider, already existent debate about environmental challenges. Other controversies related to social and economic factors are not equally highlighted in the media coverage. The media seem more inclined to question rather than congratulate the industry on its progress, seen by the skewed focus on environmental sustainability. Related to the industry's reputation such skewed focus will reinforce the negative perception of the industry. A de-emphasize of the social dimension is also problematic for policy, as the industry is a major contributor in many small, coastal areas, where a decrease in jobs, population and financial revenues could have large impacts on the local society if aquaculture activity should decrease.

This is reinforced further by the ongoing political debate in which environmental issues also dominate, and the use of sustainability seems to veil the debate. Politicians have successfully introduced the concept of sustainability into both their visions for the industry and in regulatory mechanisms. However, it is solely the dimension of environment in which sustainability is accentuated, and as sustainability is applied to both strategies for growth and strategies for increased regulation and control, the concept remains obscured. As such, one may argue that the political use of sustainability in all that is problematic in aquaculture, even its progress, legitimizes a media debate which includes everything into the concept of sustainability. The

[8] This often is referred to as *the negativity effect* [16].

macro-effect of mass media influence can thus be seen as the mutual enhancing of the significance of environmental sustainability both in political decision-making and mass media.

Acknowledgements

This work has been conducted through the research project STARR (Sustainable Aquaculture – regulation and reputation) financed by The Research Council of Norway (no. 234139). The authors would also like to thank the anonymous reviewers for suggestions to improve the article.

Appendix

Coding scheme.

Variable	Values
Article number	Unique number for each article
Headline	Headline of article
Newspaper	Dagbladet
	Klassekampen
	Dagens Næringsliv
	Bergens Tidende
	Adresseavisen
	Nordlys
	Sunnmørsposten
	Lokalavisa Nord-Salten
	Finnmarken
Date	Date published (2012–2014)
Size of article (including pictures)	Small
	Medium
	Large
Media genre	Editorial
	Debate letter
	Reportage
	Interview
	News article
	Feature
	Inquiry
	Ad (registered, but not part of analysis due to small size)
	Petit (registered, but not part of analysis due to small size)
	Note/fact box (registered, but not part of analysis due to small size)
Actor (producer of text)	Editorial staff
	Commentary
	Interest group
	Researcher/expert
	Industry representative
	Opposition party
	Government/regulatory body
	International interested party
	Other
Name of actor	(in case of debate contribution)
Topic	Technology
	Biology (fish, fish health, fish feed, etc.)
	Environment (spread of fish diseases, lice, escapes, etc.)
	Health (human health, when talking about fish as food)
	Industry (about the industry as a whole of specific companies— economy, results, licenses, etc.)
	Politics (politics related to aquaculture industry—i.e., state ownership)
	Regulation/trust (Does regulation work? Trust in regulation)
	Other
Level (content of text, not newspaper)	National (or global/international)
	Regional
	Local
Primary source used in article	(same values as Actor)
Secondary source used in article	(same values as Actor)
Tertiary source used in article	(same values as Actor)

Media / political event	Open field (if connected to an event—political or created by the media)
Risk/benefit category	Risk
	Benefit
	None
Subcategory	International innovation
	Norway's development (export and economy)
	Regional development (regions relative strength, regional innovation)
	Local development (local community, corner stone industry)
	Global health and environment (news about salmon, genes, resistance)
	National health and environment (escapes, diseases, contamination farmed-wild salmon)
	Local vulnerability (economy and environment)
	Government–industry relation
Position	Explicitly positive
	Implicitly positive
	Neutral
	Implicitly negative
	Explicitly negative
Comment	(open field)

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