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The Fukushima nuclear power plant accident. An analysis of the most relevant frames in the Spanish press

El accidente de la central nuclear de Fukushima. Análisis de los encuadres predominantes en la prensa generalista española

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ABSTRACT: The accident at the Fukushima nuclear power plant in Japan on 11 March 2011 unleashed an environmental, economic, political and humanitarian crisis whose effects are still felt today. This study analyses press coverage of the incident by three Spanish daily newspapers, *Abc*, *El País* and *La Vanguardia*, to determine the prevalent frames in the news articles on the disaster. Content analysis based on the stories published between March and May 2011 suggests that the most ubiquitous frames were human interest, economic consequences, political conflict, damage and environmental risks.

RESUMEN: *El accidente de la central nuclear de Fukushima (Japón), producido el 11 de marzo de 2011, desencadenó una crisis medioambiental, económica, política y humanitaria cuyos efectos todavía perduran. En este trabajo se aborda la cobertura del suceso por parte de los diarios españoles Abc, El País y La Vanguardia, con el propósito de determinar los frames predominantes en los textos informativos e interpretativos asociados a él. Del análisis de contenido aplicado a las piezas publicadas por las tres cabeceras entre marzo y mayo de 2011, emergen cinco enfoques: interés humano, consecuencias económicas, conflicto político, daños y riesgos medioambientales.*

Keywords: Fukushima, framing, catastrophes, nuclear accident, Spanish press.

Palabras clave: Fukushima, framing, catástrofes, accidente nuclear, prensa española.

1. Introduction

On 11 March 2011, an earthquake measuring 9.0 on the Richter Scale led to an accident at the nuclear power plant at Fukushima in Japan which, in terms of its size, was the most serious incident of its kind since Chernobyl in 1986. The tsunami that ensued swept in over the levees at Fukushima, which had not been constructed sufficiently high, and was so strong that the operators lost control of the nuclear power plant and its reactors¹ leading to a Level 7 radioactive leakage –the highest on the International Scale of Nuclear Accidents (INES)– and which caused an environmental, economic, political and humanitarian crisis whose effects are still felt today².

The world's media covered the accident extensively, as with any environmental catastrophe of this magnitude³. Four months after the tsunami, Google News was still offering 201,000 results for the word “Fukushima”⁴. Between 18 December 2013 and 17 January 2014, the total number of news items on Google was just over 63,200, so interest in this subject was persistent. This work analyses coverage in three Spanish national dailies (*Abc*, *El País* and *La Vanguardia*) of the nuclear accident at Fukushima by identifying the frames that correspond to news stories on the event.

¹ Cfr. TIBAUT, Nadine & Thierry, *Los santuarios del abismo. Crónicas de la catástrofe de Fukushima*, Pepitas de Calabaza, Logroño, 2013.

² Cfr. REUTERS, “Indigentes para limpiar Fukushima”, *El País*, 12-30-2013, http://sociedad.elpais.com/sociedad/2013/12/30/actualidad/1388428242_330917.html; EFE, “Detectan un importante aumento de radiación en los límites de Fukushima”, *El País*, 01-11-2014, http://economia.elpais.com/economia/2014/01/11/agencias/1389413606_521018.html.

³ Cfr. LORENTE, José Ignacio, ANTOLÍN, José Enrique & DOBLAS, Francisco Javier, “La construcción mediática de lo ecológico. Estrategias discursivas en la información de actualidad”, *Revista Latina de Comunicación Social*, 64, 2009, pp. 315-327, http://revistalatinacs.org/09/art/26_825_49_ULEPICC_05/Lorente_et_al.html.

⁴ Cfr. FRIEDMAN, Sharon M, “Three Mile Island, Chernobyl and Fukushima: An analysis of traditional and new media coverage of nuclear accidents and radiation”, *Bulletin of the Atomic Scientists*, 67 (5), 2011, pp. 55-65.

1.1. *Framing from the deductive and inductive perspectives*

Framing means the selection and shaping of a particular aspect of the news. It is an active process⁵ by which the media assign to the event they report on a specific definition, a causal interpretation and a moral judgement, and then wrap it up with a recommendation to its readers as to how it should be treated⁶. As Scheufele and Tewksbury⁷ suggest, framing “is a necessary tool to reduce the complexity of an issue, given the constraints of their respective media related to news holes and airtime”. It also has inevitable repercussions for the reader since “the way it focuses on a subject [...] influences the perception the public will develop on that issue”⁸.

According to Semetko and Valkenburg⁹, there are certain general frames deployed by the media that can be identified by a deductive approach to the frame construct, such as conflicts, human interest, economic repercussions, morality and apportioning responsibility. The importance of each approach varies considerably depending on the issue and the medium concerned¹⁰, nevertheless it is a heuristically useful proposal, as several works on the subject in the past 10 years attest¹¹.

Yet other authors see the deductive perspective as too rigid and not so efficient when embracing the entirety of meanings contained in a news frame¹². Hence other approaches to the study of framing avoid a priori suppositions and are based totally or partially on an inductive perspective, and these have produced approaches that are closer to the nature of the event itself on which the news story is centred.

⁵ Cfr. REESE, Stephen, “Prologue - Framing public life: A bridging model for media research”, in REESE, Stephen, GANDY, Oscar & GRANT, August (eds.), *Perspectives on media and our understanding of the social world*, Lawrence Erlbaum Associates, Mahwah, 2001, pp. 7-31.

⁶ Cfr. ENTMAN, Robert, “Framing: Toward clarification of a fractured paradigm”, *Journal of Communication*, 43 (4), 1993, pp. 51-58; GITLIN, Todd, *The whole world is watching. Mass media in the making and unmaking of the New Left*, University of California Press, Berkeley-L.A.-London, 1980.

⁷ SCHEUFELE, Dietram & TEWKSBURY, David, “Framing, Agenda Setting and Priming: The evolution of three media effects models”, *Journal of Communication*, 57 (1), 2006, p. 12.

⁸ IGARTUA, Juan José & HUMANES, M^a Luisa, “Imágenes de Latinoamérica en la prensa española. Una aproximación empírica desde la Teoría del Encuadre”, *Comunicación y Sociedad*, vol. XVII, 1, 2004, p. 55.

⁹ Cfr. SEMETKO, Holli A. & VALKENBURG, Patti M., “Framing European politics: A content analysis of press and television news”, *Journal of Communication*, 50 (2), 2000, pp. 93-109.

¹⁰ Cfr. IGARTUA, Juan José & MUÑIZ, Carlos, “Encuadres noticiosos e inmigración. Un análisis de contenido de la prensa y televisión españolas”, *Zer*, vol. 9, n^o 16, 2004, <http://www.ehu.es/zer/hemeroteca/pdfs/zer16-06-igartua.pdf>.

¹¹ Cfr. VREESE, Claes de, PETER, Jochen & SEMETKO, Holli A., “Framing politics at the launch of the Euro: A cross-national comparative study of frames in the news”, *Political Communication*, 18, 2001, pp. 107-122; IGARTUA, Juan José, CHENG, Lifan & MUÑIZ, Carlos, “Framing Latin America in the Spanish press: A cooled down friendship between two fraternal lands”, *Communications: The European Journal of Communication*, 30, 2005, pp. 359-372; IGARTUA, Juan José & HUMANES, M^a Luisa, *op. cit.*; DIMITROVA, Daniela and others, “War on the web: The immediate news framing of Gulf War II”, *The Harvard International Journal of Press/Politics*, 10, 2005, pp. 22-44.

¹² Cfr. MATTHES, Jörg & KOHRING, Matthias, “The Content Analysis of media frames: Toward improving reliability and validity”, *Journal of Communication*, 38, 2008, p. 258-279; IGARTUA, Juan José & MUÑIZ, Carlos, *op. cit.*

This article focuses on news that covers catastrophes, for which there exist several common frame¹³: human interest, environmental consequences, economic repercussions and political implications. The importance of each frame transforms over time: the media start by informing on the physical damage caused by the disaster and then shift to concentrate on the human aspect and the political consequences of the phenomena as the situation returns to normality¹⁴.

1.2. Analysis of the news treatment of the Fukushima accident

In the last three years, several studies have analysed how the world's media dealt with Fukushima, in turn revealing some prominent features of the news coverage.

Friedman points out how the convergence of traditional media and “new media” associated to Internet meant that the news flow on the disaster was particularly abundant in the US media, especially when compared to other nuclear catastrophes such as Three Mile Island (1979) and Chernobyl (1986). The potential offered by online journalism enables daily newspapers to offer “creative approaches to reporting and [...] more space and air-time for long-form articles and in-depth reporting, along with complementary infographics and multimedia projects”¹⁵. Yet the media coverage of the incident revealed certain deficiencies¹⁶, together with a plethora of sources that were not checked for reliability or corroborated, which was problematic when trying to determine the veracity of the information¹⁷.

News content varied considerably according to the geographical location of the medium relative to the accident. A work based on the use of sources by Imtihani and Yanai¹⁸ showed how the Japanese channel NHK backed the position of the country's government and that of the owner of the nuclear complex, TEPCO, regarding the accident and hindered public access to information, whereas BBC World TV gave a clear and unbiased account of what had happened at the power plant.

In Europe, the event quickly took on a political dimension and stimulated debate on the risks and opportunities of nuclear energy; editorials in the main dailies sided either in favour (so, in Spain¹⁹) or against, as in Belgium²⁰. In general, the controversy seemed to arouse journalists more than readers, which was particularly true in France²¹.

¹³ Cfr. HOUSTON, J. Brian, PFEFFERBAUM, Betty & ROSENHOLTZ, Cathy Ellen, “Disaster news: Framing and frame changing in coverage of major U.S. natural disasters, 2000-2010”, *Journalism & Mass Communication Quarterly*, 89, 2012, pp. 606-623.

¹⁴ Cfr.: HOUSTON, J. Brian, PFEFFERBAUM, Betty & ROSENHOLTZ, Cathy Ellen, *op. cit.*, p. 616; FRIEDMAN, Sharon M., *op. cit.*, p. 60.

¹⁵ Cfr. IONESCU, Tudor B., “Communicating in Germany about the Fukushima accident: How direct encounter beat media representations”, *Environmental Communication: A Journal of Nature and Culture*, 2012, <http://dx.doi.org/10.180/17524032.2012.672443>.

¹⁶ Cfr. FRIEDMAN, Sharon M., *op. cit.*, p. 63.

¹⁷ Cfr. FRIEDMAN, Sharon M., *op. cit.*, p. 63.

¹⁸ Cfr. IMTIHANI, Najih & YANAI, Mariko, “Media coverage of Fukushima nuclear power station accident 2011 (A case study of NHK and BBC World TV stations)”, *Environmental Sciences*, 17, 2013, pp. 938-946.

¹⁹ Cfr. GARCÍA-MESTRES, Maite, MATEU, Anna & DOMÍNGUEZ, Martí, “Fukushima en la prensa española. El debate científico sobre la energía nuclear a través de los géneros de opinión”, paper presented at the III Congress of the Asociación Española de Investigación de la Comunicación “Comunicación y riesgo”, 18-20 January 2011 (Tarragona).

In terms of the frames applied to the news event, Rausch²² identifies the main frames in the local Japanese press as assistance to victims, damage and reconstruction, the latter in particular as measures were adopted to offset the effects of the disaster. Lazic²³, in an analysis based on work by Semetko and Valkenburg²⁴ on *The New York Times*, *USA Today* and the *Los Angeles Times*, highlighted the approaches of conflict, economic repercussions and apportioning blame. Giannakopoulos²⁵ drew similar conclusions in a study of news items on the incident published by *Der Spiegel*, *Japan Times* and the *Los Angeles Times*²⁶, with the human interest frame as the most prominent.

2. Objective

The study of the news coverage of the accident at Fukushima by the Spanish press has so far only analysed opinion pieces²⁷. So this was a good opportunity to examine both the informational and interpretative aspects of the story. We based our investigation on six research questions (RQ):

RQ1: What are the most prominent features of the news on Fukushima published by the Spanish dailies?

RQ2: Do the generic approaches established by Semetko and Valkenburg²⁸ appear in the coverage of the nuclear accident and its consequences?

RQ3: Is it possible to detect other non-generic approaches in the coverage?

RQ4: What are the most frequently used frames in the coverage of Fukushima? Are there differences between the newspapers in this respect?

²⁰ Cfr. PERKO, Tanja, TURCANU, Catrinel & GENNEN, Dries, “Media reporting and changes in public opinion after Fukushima nuclear accident: Belgium as case study”, *International Journal of Nuclear Governance, Economy and Ecology*, 3 (4), pp. 291-307. In this case, the coinciding with the 25th anniversary of the accident at Chernobyl might explain the editorial stance in many newspapers which, according to the authors, went from neutrality to outright opposition in less than a month.

²¹ Cfr. DE LA POYPE, Ann-Louise & SOOD, Suresh, “Public sphere dialogue in online newspapers and social spaces: The nuclear debate in post Fukushima France”, *Public Communication Review*, 2 (2), 2012, pp. 30-47. The authors dissect reactions to the disaster of users of the online versions of French newspapers showing how, despite the impact of the news story, the pronouncements on nuclear energy itself were scarce.

²² Cfr. RAUSCH, Anthony S., “Framing a catastrophe: Portrayal of the 3.11 Disaster by a local Japanese newspaper”, 2012, <http://www.japanesestudies.org.uk/ejcs/vol12/iss1/rausch.html>; RAUSCH, Anthony S., “The regional newspaper in post-disaster coverage: Trends and frames of the Great East Japan Disaster”, *Keio Communication Review*, 35, 2013, pp. 35-50.

²³ Cfr. LAZIC, Dragana, “News analysis of the Fukushima accident: Lack of information disclosure, radiation fears and accountability issues”, *Journal of Contemporary Eastern Asia*, 2013, 12 (2), pp. 19-34.

²⁴ Cfr. SEMETKO, Holli A. & VALKENBURG, Patti M., *op. cit.*

²⁵ Cfr. GIANNAKOPOULOS, Thanos, “Framing the Fukushima Daichii nuclear accident”, 2013, [http://www.researchgate.net/publication/237063254_Framing_the_Fukushima_Daiichi_Nuclear_Accident_an_International_Comparative_Study_of_News_Frames_in_Der_Spiegel_the_Japan_Times_and_the_Los_Angeles_Times_Vienna_Univeristy_of_Leicester_March_2013_\(Distinction\)](http://www.researchgate.net/publication/237063254_Framing_the_Fukushima_Daiichi_Nuclear_Accident_an_International_Comparative_Study_of_News_Frames_in_Der_Spiegel_the_Japan_Times_and_the_Los_Angeles_Times_Vienna_Univeristy_of_Leicester_March_2013_(Distinction)).

²⁶ The sample used by Giannakopoulos is limited (n= 60), but the work is of interest particularly for the comparison drawn between newspapers in various parts of the world which, logically, frame the news in different ways.

²⁷ Cfr. GARCÍA-MESTRES, Maite, MATEU, Anna & DOMÍNGUEZ, Martí, *op. cit.*

²⁸ Cfr. SEMETKO, Holli A. & VALKENBURG, Patti M., *op. cit.*

RQ5: Is there a correlation between the predominant frame type in a text and the importance given to it by that particular medium?

RQ6: Do some approaches associate to others on a frequent basis? If so, what are the most frequent correlations?

3. Methodology

This research was carried out by selecting three Spanish national dailies *Abc*, *El País* and *La Vanguardia*²⁹ from which we extracted all news stories (news in brief, news reports, features, articles and analysis) related to the Fukushima accident published between 12 March and 31 May 2011³⁰.

Since this was a small sample, we decided to analyse the three newspapers from cover-to-cover using the *Mynews* application to recover all relevant news items, which yielded 250 units.

A codebook was designed and structured in three groups:

a) Basic data. Newspaper name (1= *El País*, 2= *Abc*, 3= *La Vanguardia*), month (3= March, 4= April, 5= May), day of the month (in numbers), day of the week (from 1= Monday, to 7= Sunday), section (1= International, 2= Society, 3= Economy, 4= National, 5= Culture, 6= Communication, 7= Other) and genre (1= news, 2= features, 3= articles, 4= briefs, 5= analysis).

b) Indicators of the importance of a unit of analysis in the daily's coverage of the news. We recorded whether the article appeared on even- (0) or odd-numbered pages (1), if a page reference was made to that article on the front page (1) or not (0), whether the article opened a section of the newspaper (1) or not (0) and if it came with a photo or graphics (1) or not (0). The size of the unit was also measured (1= one column or less, 2= banner, 3= half a page, 4= three quarters of a page, 5= a full page or more). Following the procedure established by Igartua and Humanes³¹, these five variables can be used to construct an "index of relative importance" regarding all news items that appear in the press, based on the COUNT command of Version 20 of the IBM SPSS program. This index determines that an item is of significant importance if reference is made to it on the front page (1), it appears on an odd-numbered page (1), it opens a section (1), is over half a page in length (4 or more) and includes a photo or graphic of some description (1). The range for these variables is from 0 (of minimal importance) to 5 (maximum).

c) News frames and their grouping in two blocks:

c.1) Generic frames. This research work has adapted a scale developed by Semetko and Valkenburg³² that assessed five types of frame through a specific set of dichotomous items (1= presence, 0= absence): apportioning responsibility (composed of five items),

²⁹ The choice of newspapers was conditioned by the authors' interest in carrying out a study that enabled a comparison between the news frames applied to Fukushima and those to Chernobyl in 1986; consequently, other Spanish national dailies such as *El Mundo* or *La Razón*, which came to market after 1986, were not included in the sample.

³⁰ The sample time frame for our research matches the periodization of the news impact of the accident as determined by HOUSTON, J. Brian, PFEFFERBAUM, Betty & ROSENHOLTZ, Cathy Ellen, *op. cit.* From June 2011, the authors detected a clear drop in interest by the media for news stories related to Fukushima.

³¹ IGARTUA, Juan José & HUMANES, M^a Luisa, *op. cit.*, p. 59.

³² Cfr. SEMETKO, Holli A. & VALKENBURG, Patti M., *op. cit.*

human interest (in the original version there were five items, whereas in our study we use six), conflict (four items), morality (three items) and economic repercussions (three items).

c.2) Specific frames. One of the aims of this study was to identify the frames that were specific to the news on Fukushima. From a random reading of the units of analysis, the authors' deductive work and a scientific literature³³ review we found 19 new dichotomous items (Table 1) from which we expected to discover four specific frames:

- 1) Environmental consequences.
- 2) Political consequences.
- 3) Health consequences.
- 4) Infrastructure consequences.

Due to the small number of texts selected, one member of the research team acted as selector and encoder of the complete sample, so it was not necessary to calculate reliability among several encoders.

Once the data matrix had been analysed, various statistical tests were run to resolve research queries using factorial analysis, the ANOVA of one factor, Pearson correlations and contingency tables via the chi-square test.

4. Results

4.1. Description of the coverage of the Fukushima accident

Of the 250 analysis units recorded, 115 (46%) were published by *El País*, 84 (33.6%) in *La Vanguardia* and 51 (20.4%) in *Abc*. The majority of the texts appeared in the first two months of the period under analysis, March (180, or 72%), April (62, or 24.8%) and May (8, 3.2%).

A total of 86.8% of the items were found in International, and the rest were spread across other sections, the second most frequent being Economy (3.6%). The newspapers treated the incident mainly as a news item (63.2%) in terms of genre and as a feature piece in 22% of cases; it also appeared as article (12%) and analysis (2.8%).

All three newspapers dedicated considerable space to Fukushima, with 45.6% of news print on the subject taking up more than one page, 33.6% three quarters of, or one complete, page and 16.8% half a page. In addition, 89.2% of texts included photos or graphics, and 19.6% referred the reader to the text by citing it on the front page.

The indicator of importance average of the analysis units was 2.46 ($Dt= 1.07$), with no significant differences detected between the information published in March and April [$t(240)= 0.853$. $p=0.394$], whereas there were differences between the three newspapers themselves [$F(2)= 7.09$. $p= 0.001$]: the news items appearing in *Abc* scored a significantly higher average ($M= 2.94$) than those published in *El País* (2.27) and *La Vanguardia* (2.41), whose texts recorded the same average relevance. These variations are statistically significant for the Tukey HSD post-hoc tests ($p= 0.001$ when comparing *Abc* to *El País*; $p= 0,015$ comparing *Abc* with *La Vanguardia*).

³³ Cfr. HOUSTON, J. Brian, PFEFFERBAUM, Betty & ROSENHOLTZ, Cathy Ellen, *op. cit.*; FRIEDMAN, Sharon M., *op. cit.*; IONESCU, Tudor B., *op. cit.*; IMTIHANI, Najih & YANAI, Mariko, *op. cit.*; RAUSCH, Anthony S., 2012, *op. cit.*, y 2013, *op. cit.*; LAZIC, Dragana, *op. cit.*; GIANNAKOPOULOS, Thanos, *op. cit.*

4.2. *News frames*

RQ1 aimed to reveal the thematic characteristics most widely represented in items on Fukushima appearing in the three dailies sampled. The frequency of the items analysed (Table 1) enables us to confirm to what extent these characteristics are present within the corpus studied, and thus perceive the most common issues featuring in the coverage of the accident.

Most items (74.4%) pointed to factors beyond human control as the cause of the problem, in clear reference to the earthquake and subsequent tsunami. And almost 70% of the information referred to the effect on the environment. Two thirds of news mentioned the need for urgent action by the authorities. Some 60% of items alluded to the environmental risks resulting from the accident, the long-term effects on the health of the local population and/or the number of those affected (injured, dead, missing or displaced). Other characteristics of at least 50% of the news were images that could arouse feelings among readers, the reference to problems with getting supplies of basic necessities to those most in need, and the personal testimonies of those involved.

Considering more restricted parameters, one third of news deployed emotive adjectives or personal descriptions, listed infrastructure problems, mentioned recommendations to public bodies in order to prevent further dangers to the health of the local population, named a particular institution with the power to solve or alleviate the situation, showed the human face of the tragedy, talked of the damage to the residences of the citizens affected and/or included criticism aired by a political party, individual, group, institution or country. Around 25% of texts contained three other items: references to a governmental crisis, statements made by authorities concerning the behaviour of the protagonists in the event and the negative economic consequences for the population. All the other variables only appeared in 20% of the sample.

In terms of the newspapers' assessment of the event, 52.4% of items were negative in outlook, as would be expected in any coverage of a catastrophe; yet in 39.6% of cases the assessment was ambiguous or unclear, while 8% of stories were upbeat on the incident. There were no significant differences between the three dailies [$\chi^2(4, N=250)=0.68, p=0.953$].

RQ2 posed whether newspaper texts on Fukushima would contain generic news frames. To find out, 21 items were subjected to an exploratory factorial analysis of the main components with Varimax orthogonal rotation. The KMO was 0.734 and the Bartlett χ^2 test for contrast was statistically significant ($p < 0.000$), underlining the relevance of the factorial analysis and the medium-to-high quality of the test. All the items had values superior to 0.40, with "Reference to the economic repercussions for the population" scoring highest (0.77) and "Suggestions regarding solutions to the problem or issue" lowest (0.46).

The rotated component matrix revealed the lack of correspondence within the structure of the factors: we found seven frames and not the five proposed on the original scale which explains the 62.60% of variance within which the number of items in each frame diverged. Also, only three of the emerging dimensions passed the tests for reliability, which meant that there was no empirical evidence that the items constituting four of the approaches found could be used to measure the same theoretical concept.

Table 1: Presence of items in the news on Fukushima (n= 250)

Items	Yes (%)
The social context or situation (abstract factors or those removed from the human aspect) is the cause of the issue or problem	74.4
Reference to the effects caused by the event or human action on the environment	69.6
Mention of two or more differing stances on the issue or problem	64.0
Suggestion that the problem requires urgent action	63.2
Reference to public statements by experts, investigators or organizations on the environmental effects	63.2
Mention of the risks to the environment as a result of the event	60.0
Mention of the risks or damage to the health of the population in the present or future	58.0
Mention of the number of those affected by the event (injured, dead, missing, displaced)	57.2
Content with visual information that could generate feelings of grievance, empathy, benevolence or compassion	53.2
Reference to problems with supplies of basic necessities (water, electricity and food)	50.4
Inclusion of testimonies from those people involved in the event	50.0
Use of emotive adjectives or personal descriptions that arouse feelings of grievance, empathy, benevolence or compassion	36.0
Reference to problems of infrastructure, hospitals, schools and communications	35.6
Mention of recommendations to institutions to offset danger to the health of the population	33.2
Mention of a particular institution with the authority to solve or alleviate a problem	32.0
Showing the human side of the issue or problem (citing a particular case)	31.2
A political party, individual, group, institution or country that issues a statement criticizing another political party, individual, institution or country	30.4
Mention of destruction or damage to homes	30.4
Reference to a crisis in local, regional or national governments	25.6
Reference to statements by foreign political authorities or international bodies on the behaviour of the protagonists in the event	25.2
Reference to the economic repercussions for the population	24.0
Emphasis on how individuals or groups are affected by the issue or problem	22.0
Opinions detailing specific social measures that could be taken on how to act	18.4
Mention of disagreement between political parties, individuals, groups, institutions or countries	17.2
Intention to draw a moral or exemplary conclusion from the issue	17.2
Mention of financial gains or losses that could occur in the present or future	16.0
Delving into the private lives of the actors or protagonists	15.6
Reference to morality or ethics, to God or other religious principles	15.6
Reference to the costs associated to the problem	14.8
Suggestions regarding solutions to the problem or issue	12.0
Naming an individual, group, institution or country as being responsible for the issue or problem	10.4
Mention of the adoption of legal measures related to the setting affected by the event	9.2
Reference to winners and losers	4.0
Reference to financial aid assigned by the authorities for repair and reconstruction	3.6
Mention of construction or reconstruction of public and private infrastructure	3.2
Mention of sackings or change of personnel in political posts	2.8
Reference to human resources destined for construction and repair work	1.2

The first factor, human interest, reduced its number of items from six to five (Cronbach's Alpha 0.81). The second (economic consequences; $\alpha = 0.82$), the third (conflict; $\alpha = 0.47$) and the fourth (morality; $\alpha = 0.49$) all maintained their primitive structure. The fifth factor, originally entitled the apportioning of responsibility, dropped from five to three items, and was renamed "treatment frame" ($\alpha = 0.40$). A sixth factor was extracted, named "apportioning of social responsibility" and was composed of two items ($\alpha = 0.38$): "Reference to winners and losers" and "Naming an individual, group, institution or country as being responsible for the issue or problem". The seventh factor was called "causal attribution frame" and contained two items ($\alpha = 0.25$): "The social context or situation (abstract factors or those removed from the human aspect) is the cause of the issue or problem" and "Inclusion of testimonies from those people involved in the event". However, the latter item loaded in the virtually the same terms in the first factor.

Resolving RQ2, the data analysis found only three of the five generic frames proposed in the original scale, human interest, economic consequences and conflict, similar to the results obtained by Giannakopoulos in his work on *Der Spiegel*, *Japan Times* and the *Los Angeles Times*³⁴.

RQ3 posed whether there existed any frames that were specific to this study. To resolve this question, 37 items (18 from Semetko and Valkenburg's adapted scale and 19 specific hypothesized items) were subjected to an exploratory factorial analysis of the main components with Varimax orthogonal rotation. The KMO was 0.720 and the Bartlett χ^2 test for contrast was statistically significant ($df = 666$, $p < 0.000$), underlining the relevance of the factorial analysis and the medium-to-high quality of the test. None of the items scored less than 0.40 in their extraction communalities, and the mean of the communalities was 0.63. "Mention of financial gains or losses that could occur in the present or future" scored the highest (0.783) and "Reference to the effects caused by the event or human action on the environment" the lowest (0.482).

The analysis extracted 12 components (self-values greater than 1) which explained the 63.22% of the total variance, as observed in Table 2:

Table 2: Factorial structure of the second analysis based on 37 items

Frame	Title	N° items	explanatory variance %
1	Human interest	6	9.30
2	Damage	5	8.04
3	Economic consequences	3	6.41
4	Risks	4	5.68
5	Political conflict	5	4.97
6	Political measures	2	4.84
7	Morality	2	4.41
8	Treatment	3	4.25
9	Repair and reconstruction	2	4.19
10	----- ¹	2	3.86
11	Apportioning responsibility	2	3.77
12	Context	1	3,43

¹ This factor was unnamed since the items set lacked substantive meaning

³⁴ Cfr. GIANNAKOPOULOS, Thanos, *op. cit.*

The results presented a complex factorial structure that made interpretation difficult: some items loaded on more than one component and others turned up in a frame different from the one hypothesized, or did not score more than 0.40 in any frame.

We ran an internal consistency analysis of the factors found to determine whether the creation of additive indexes for the frames could provide us with a reliable measurement tool. The reliability tests yielded satisfactory results for the human interest frame (Cronbach's Alpha³⁵ = 0.79), damage (a = 0.74) and economic consequences (a = 0.82), but not for risks (a = 0.57), political conflict (a = 0.55), political measures (a = 0.46), morality (a = 0.67), treatment (a = 0.40), repair and reconstruction (a = 0.52), "the tenth factor" (a = 0.25), apportioning responsibility (a = 0.38) and context (only one item).

The results of this analysis seemed somewhat parsimonious, hindered interpretation and offered no possibility for creating reliable indicators to measure the frames which had emerged from the data, so it was decided to remove a large quantity of items from the equation and repeat the analysis. This second exploration aimed to reduce the number of factors –which gave precedence to the parsimony of the results– and to improve the internal consistency of the additive indexes that we would have to create later.

On this occasion we included only 17 items, selected for their relevance in terms of statistics and content. The KMO was 0.77 and the Bartlett χ^2 test for contrast was statistically significant (df = 136, p < 0.000), underlining the relevance of the factorial analysis and the medium-to-high quality of the test. None of the items scored less than 0.40 in their extraction communalities. The mean of the communalities was 0.64, the lowest score being 0.50 and 0.78 the highest.

The results of the analysis revealed five components to explain the 64.27% of the total variance. This index falls within the set of satisfactory values for Humanities and Social Sciences, at between 50% and 60%; and although some authors raise the threshold to 75%, this is, according to Henson and Roberts³⁶, an unrealistic expectation. We recall that the seminal analysis carried out by Semetko and Valkenburg³⁷ only explained 54.2% of the variance.

Given that the dichotomous items can be limited when applied in a factorial analysis of the main components, we used a specific method for classifying binary variables³⁸ performing a hierarchical cluster analysis of the variables using the Ward method and the squared Euclidean distance. This operation revealed the same five factors, or clusters, obtained before.

The definitive factorial structural is as follows (Also see Table 3):

a) The first frame, human interest, explained 16.32% of the total variance. In the end, it consisted of four items whose addition to an indicator passed the reliability tests (a = 0.84). A prototypical example of a news story in which this frame is prominent is the headlined "Tokyo prepares for a radioactive cloud" (*Abc*)³⁹.

b) Damage, as the second frame, accounted for 13.94% of the variance. It was made up of four items, and its aggregated index scored a satisfactory result in the internal

³⁵ IBM SPSS uses the Kuder-Richardson (KR20) reliability coefficient as here we deal with binary items.

³⁶ Cfr. HENSON, Robin K. & ROBERTS, J. Kyle, "Use of exploratory factor analysis in published research: Common errors and some comment on improved practice", *Educational and Psychological Measurement*, 66, 2006, pp. 393-416.

³⁷ Cfr. SEMETKO, Holli A. & VALKENBURG, Patti M., *op. cit.*, p. 99.

³⁸ Again we follow the method applied by SEMETKO, Holli A. & VALKENBURG, Patti M., *op. cit.*, to verify the structure of the components.

³⁹ DÍEZ, Pablo M., "Tokio se blind a la espera de una nube radiactiva", appearing in *Abc*, 03-17-2011, pp. 20-21.

consistency tests ($\alpha = 0.75$). As a news model for this frame, see the *Abc*⁴⁰ news item with the headline “Radioactive leak in Japan”.

c) Economic consequences, the third frame, explained 13.35% of the variance; it retained its three classic items and passed the reliability test ($\alpha = 0.82$). The newspaper text headlined “The economic earthquake arrives today” (*La Vanguardia*)⁴¹, best sums up the features that appear in examples of this frame.

d) The fourth frame is political conflict, accounting for 11.97% of the variance. It is formed of four items and its aggregate index did not exceed the standard values of the reliability tests ($\alpha = 0.63$). Nevertheless since this is an exploratory study, and in line with other authors⁴², an average that scores higher than 0.60 is deemed to be valid. A typical example of a news story in which this frame is clearly prominent is “France attacks Brussels for making light of nuclear risk” (*La Vanguardia*)⁴³.

e) Environmental risks constitutes the fifth frame, explaining 8.85% of the total variance. It only has two items, and the index set yielded a result similar to that found in the previous frame ($\alpha = 0.60$), acceptable but with reservations. The news text with the headline “Hiroshima protests against nuclear power stations” (*El País*)⁴⁴ is an example of this factor.

Table 3: Rotated component matrix¹

	Frames				
	HI	DAM	EC	PC	ER
Showing the human side of the issue or problem (citing a particular case)	.857				
Emphasis on how individuals or groups are affected by the issue or problem	.824				
Delving into the private lives of the actors or protagonists	.821				
Use of emotive adjectives or personal descriptions that arouse feelings of grievance, empathy, benevolence or compassion	.690	.224			
Reference to problems of infrastructure, hospitals, schools and communications		.787			
Reference to problems with supplies of basic necessities (water, electricity and food)		.743			
Mention of destruction or damage done to homes		.735			
Mention of the number of those affected by the event (injured, dead, missing, displaced)		.657			
Mention of financial gains or losses that could occur in the present or future			.869		
Reference to the costs associated to the issue or problem			.865		
Reference to the economic repercussions for the population			.841		
Mention of disagreement between political parties, individuals, groups, institutions or countries				.738	

⁴⁰ DÍEZ, Pablo M., “Fuga radiactiva en Japón”, in *Abc*, 03-15-2011, p. 32.

⁴¹ AGENCIAS, “El terremoto económico llega hoy”, in *La Vanguardia*, 03-14-2011, p. 4.

⁴² Cfr. MALHOTRA, Naresh, *Investigación de mercados. Un enfoque práctico*, Prentice-Hall, México, 1997; STURMEY, Peter and others, “The PAS-ADD checklist: Independent replication of its psychometric properties in a community sample”, in *British Journal of Psychiatry*, 186, 2005, pp. 319-323.

⁴³ NAVARRO, Beatriz, “Francia fustiga la ligereza de Bruselas al hablar del riesgo de las nucleares”, in *La Vanguardia*, 03-18-2011, p. 8.

⁴⁴ HIGUERAS, Georgina, “Hiroshima clama contra las nucleares”, appearing in *El País*, 03-19-2011, p. 16.

Reference to statements by foreign political authorities or international bodies on the behaviour of the protagonists in the event				.688	
A political party, individual, group, institution or country that issues a statement criticizing another political party, individual, institution or country				.644	.205
Mention of the adoption of legal measures related to the setting affected by the event				.632	
Reference to public statements by experts, researchers or organizations on the environmental effects					.808
Mention of the risks to the environment as a result of the event					.789

Extraction method: Analysis of main components.

Rotation method: Varimax with Kaiser normalization.

¹ Rotation converged in five iterations: HI= human interest; DAM= damage; EC= economic consequences; PC= political conflict; ER= environmental risks.

The aim of RQ4 was to reveal the news frames that appeared most frequently in coverage on Fukushima, and to see whether these frames were treated differently by the three daily newspapers analysed. The index scores indicate that environmental risks was the most common frame, with an average of 0.61 out of 1, with a standard deviation of 0.41. The next most common frames were damage (M= 0.43. Dt= 0.36), human interest (M= 0.26. Dt= 0.35), political conflict (M= 0.20. Dt= 0.27) and economic consequences (M= 0.18. Dt= 0.33). The comparison of means tests (the ANOVA of a factor) revealed significant differences between the three newspapers only in relation to the political conflict frame [Welch F (2)= 6.33. p= 0.002], more frequent in *El País* (M= 0.24) than in *Abc* (M= 0.11).

RQ5 asked whether texts with a particular focus were given more importance than others. Pearson's correlation coefficient indeed indicated that news stories corresponding to the damage frame were more prominent in all three dailies [r(250)= 0.23. p= 0.000]. We also found a significant correlation between the relevance of the news and the environmental risks frame; however, the coefficient value was so small that it hardly registered [r(250)= 0.15. p= 0.14].

Finally, RQ6 questioned whether there was any correlation among the frames found, that is, if one frame tended to coincide with another or others. To answer this question, we ran a series of Pearson correlations between the five indicators, and the results are significant in that they are on the 0.01 level (bilateral). The human interest and damage frames tended to appear together since they are positively correlated [r(250)= 0.34. p= 0.000]. However, human interest was not usually present in the same texts as those representing the political conflict [r(250)= -0.24. p= 0.000] and environmental risks frames [r(250)= -0.21, p= 0.001]. Neither do the damage nor political conflict frames appear in the same news stories, which produced a negative correlation between them [r(250)= -0.34, p= 0.000].

5. Discussion and conclusions

Our analysis of the treatment of Fukushima by the three Spanish national daily newspapers selected reveals the following: a) that *El País* gives the accident the most column inches, followed by *La Vanguardia*, which is in line with the importance both usually give to foreign news stories when these lead their editions; b) that the majority of texts are framed within the International section; c) that the predominant genre of

these frames is news; d) that these news items are usually substantial and accompanied by photos or graphics; e) that the importance given to the story by the three newspapers is notable given that it is an event that occurred abroad⁴⁵ (M= 2.46. Dt= 1.07).

In terms of themes (RQ1), the concern for the effects of the disaster on the environment is a topic that traverses the entire sample. On the one hand, reference to the damage caused by the accident and the consequences for the population is very common in the texts, which is logical since they are reporting a catastrophe. Equally frequent is the position that the government was not responsible for the event, blaming it instead on natural causes. Political and economic questions, or those related to reconstruction, are given secondary importance. And as expected, the incident is presented from a negative perspective in the majority of cases.

On the other hand, data from the analysis reveal that some generic frames do not emerge so clearly in the treatment of the accident by the three dailies, specifically in terms of the apportioning of responsibility and morality, as also occurred in research by Giannakopoulos⁴⁶ and to a certain extent in Lazic⁴⁷. Thus we consider that the scale elaborated by Semetko and Valkenburg⁴⁸ is insufficient for the analysis of the news coverage of this event (RQ2).

Of the four specific hypothesized frames (RQ3) only three were identified, and these with qualifications. Firstly, where we expected to find two frames related to the consequences of the disaster (health and infrastructure) we found only one, that which referred to damage, so, we deduced that the texts tended to group together the negative effects of the event. Secondly, the frame related to politics hardly mentioned the measures adopted by the authorities in response to the accident, as was our initial belief, and yet it includes numerous items belonging to the conflict frame; we believe that this shows the importance given to the controversy between public institutions regarding information on the political implications of the event. Thirdly, one focus was identified that referred to the environmental effects, based mainly on the risks arising from the radioactive leakage.

In general, we agree with Houston and others⁴⁹ on the frames most commonly found in information on catastrophes, with one exception: damage, which these authors do not identify, although it is cited by Rausch in an analysis of news coverage of Fukushima by the local Japanese press⁵⁰.

With this in mind, we can conclude that the specific nature of the news event conditions the effectiveness of generic frames, and means that frames also supported in the inductive approach are necessary. So it seems reasonable to believe that, in the future, instruments will be used that adapt to the different modalities of news, and more specifically, will be oriented towards the treatment of catastrophes, which may lead to a scale of frames that are as closely adjusted to this type of event as possible.

The most commonly used frame in the three dailies (RQ4) was environmental risk. There are hardly any differences in this sense between the three newspapers, and there

⁴⁵ Cfr. IGARTUA, Juan José & HUMANES, M^a Luisa, *op. cit.*, p. 63. In relation to the information on Latin America published by Spanish daily newspapers of reference, they obtain M= 1.44. Dt= 1.28.

⁴⁶ Cfr. GIANNAKOPOULOS, Thanos, *op. cit.*

⁴⁷ Cfr. LAZIC, Dragana., *op. cit.* In this case, the human interest frame, located in our sample, was replaced by the apportioning of responsibility.

⁴⁸ Cfr. SEMETKO, Holli A. & VALKENBURG, Patti M., *op. cit.*

⁴⁹ Cfr. HOUSTON, J. Brian, PFEFFERBAUM, Betty & ROSENHOLTZ, Cathy Ellen, *op. cit.*, pp. 614-615.

⁵⁰ Cfr. RAUSCH, Anthony S., 2012, *op. cit.*

are only dissimilarities between *El País* and *Abc* in terms of the political conflict frame, which stands out more in the former.

Finally, the texts given most importance (RQ5) are those in which the damage frame is prominent, and this usually associated to human interest (RQ6).

The relevance given to news stories that focus on the disastrous consequences of the accident for the inhabitants of Fukushima (RQ5) seems to indicate a tendency to sensationalize coverage of the event. The debate on the environment and energy model, which is an ideological question, hardly appears in informational or interpretative texts on the event, being shifted, as García-Mestres and others⁵¹ point out, to the opinion pages normally read by the elites but less so by the general reading public.

In conclusion we reiterate that ours is an exploratory work since there are few studies that deal with the treatment of catastrophes by the Spanish press that use framing theory tools. There are several future lines of research to follow such as an analysis based solely on editorials or opinion pieces, which would probably produce frames that differ from those in our study, and would be an interesting path to investigate. We also believe that broadening the timescale of the study would inevitably yield new frames, like one related to the reconstruction work whose link to the frames identified in this work could be revealing.

⁵¹ Cfr. GARCÍA-MESTRES, Maite, MATEU, Anna & DOMÍNGUEZ, Martí, *op. cit.*

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