



Media coverage and government policy of nuclear power in the People's Republic of China



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ABSTRACT

China has vigorously pursued nuclear power and has developed a series of ambitious nuclear power policies in the past several years. To smoothly implement these policies, the Chinese government wants to mobilize public support because a high level of public acceptance helps legitimize these policies. Considering that news media can influence public opinion, we analyzed the content of news articles related to nuclear power in two Chinese mainstream newspapers, *The People's Daily* and *The Guangming Daily*, between 2004 and 2013. The results show that the articles in the two newspapers primarily reflected pro-nuclear or informational statements, whereas anti-nuclear opinions were rarely published. Pro-nuclear arguments most often focused on environmental benefits and safety, which have been frequently emphasized in the Chinese government's nuclear power policies. These findings indicate that the mainstream news coverage of nuclear power is highly consistent with the Chinese government's pro-nuclear policies, which suggests that the government had a significant impact on the content reported by the mainstream media in China. Lastly, this study proposes some policy recommendations for nuclear power development in China.

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1. Introduction

To meet increasing energy demands, optimize energy infrastructures, and reduce greenhouse gas emissions, some countries have expressed growing interest in developing nuclear power. Specifically, China has markedly expanded its nuclear power program and has made a series of ambitious plans in recent years. In China, 21 nuclear power units are currently in operation, and 28 units are under construction (IAEA, 2014).

China is determined to develop nuclear power for two reasons. First, China wants to develop nuclear power due to its relatively benign environmental impact. For example, the Medium- and Long-term Nuclear Power Development Plan (2005–2020), which was approved by the State Council of China in October 2007, noted that nuclear power has essentially no sulfur dioxide, fuel dust, nitrogen oxide, and carbon dioxide emissions, unlike coal-fired power; moreover, replacing part of the coal-generating capacity by nuclear power is crucial for alleviating the greenhouse gas effect

(State Council of China, 2007). In addition, *China's Energy Conditions and Policies*, a white paper (government document) issued by the Information Office of the State Council in December 2007, declared that environmental protection is the basic state policy because the consumption of coal, the main energy resource in China, increases environmental problems, such as smog, air pollution, and greenhouse gas emission. To fight climate change and protect the environment, developing energy should highlight the importance of minimal environmental impact. Moreover, China signed the United Nations Framework Convention on Climate Change and established the National Coordination Committee for Climate Change. Notably, the white paper advocated the active development of nuclear power in China (State Council Information Office, 2007). According to *China's Energy Policy* (2012), approved by the State Council of China in October 2012, developing new and renewable energy is indispensable to protecting the environment and fighting climate change. By the end of the 12th Five-Year Plan, the installed generating capacity of non-fossil fuels will account for 30% of China's primary energy consumption (Xinhua News Agency, 2012).

Second, China wants to develop nuclear power due to the proven record in nuclear safety management in China. For instance, the Medium- and Long-term Nuclear Power Development Plan (2005–2020) shows that the safety performance of nuclear power

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plants in China is above average and that the operation level is quite reliable and continuously improving (State Council of China, 2007). Additionally, China's Energy Policy (2012) emphasizes developing nuclear power in a safe way; guaranteeing nuclear safety is essential for nuclear power development. China has carried out comprehensive inspections on the safety of all of its nuclear power plants since the Fukushima accident. The inspection results indicate that the safety of nuclear power plants in China has and continues to provide adequate protection for the health and safety of the public. In the past 20 years, no accident at or above Level 2 has occurred in any operational nuclear power unit in China. Furthermore, the major operating parameters exceed the world's average operating performance, and some indices even reach the world's leading or advanced levels (Xinhua News Agency, 2012).

According to the Nuclear Power Safety Plan (2011–2012) and the Mid- and Long-term Development Plan for Nuclear Power (2011–2020) issued by the State Council of China in October 2012, during the period 2011–2015, no nuclear power projects will be launched in inland provinces, and only a few projects that have passed adequate safety and environmental reviews will be constructed in coastal regions. The world's highest safety standards will be applied to the construction of new nuclear power units, and the principle of 'safety first' must be insisted upon throughout processes, including planning, construction, and operation (Chinese Central Government, 2012).

Based on the series of nuclear power policies mentioned above, we can find that the Chinese central government is in favor of developing nuclear power; specifically, government policies concentrate on the environmental benefits and safety of nuclear power. However, the well-documented potential safety, security, economic, and environmental risks relevant to nuclear power may also lead to a low level of public support (Culley et al., 2010). By selecting which information to include and exclude (Iyengar and Kinder, 1987; Pan and Kosicki, 1993), the media coverage has a significant impact on public opinion on societal issues (Delshad and Raymond, 2013; Fryberg et al., 2012; Herman and Chomsky, 1988; Hodgetts and Chamberlain, 2007; Markel et al., 2007; Scheufele and Tewksbury, 2007; Soroka et al., 2013; Vreese et al., 2011; Zhang and Min, 2013). Accordingly, news media can have different impacts on public discourse by applying its media vehicles (e.g., print media) to facilitate understanding and enhance public participation or to form negative stereotypes of marginalized groups (Culley et al., 2010). Considering that the media has an important impact on public opinion and the relevance of the nuclear power debates, analyzing the media portrayal of nuclear power is of particular interest.

This study is dedicated to examining the media portrayal of nuclear power in China, which is one of the most prominent economies in the world. The present study focuses on the content analysis of nuclear power in two Chinese newspapers, *The People's Daily* (Chinese: 人民日报) and *The Guangming Daily* (Chinese: 光明日报), from 2004 to 2013. This study aims to provide descriptive information on the content of media coverage about nuclear power in the Chinese mainstream media to examine exactly which types of information have been transmitted to the public. Previous studies on the media coverage of controversial topics have revealed that manipulation of information in the media generally aims to benefit more powerful groups (Herman and Chomsky, 1988). This suggests that the government mainly decides what the media reports (Takahashi, 2011). Therefore, this study attempts to further examine government's impact on the media. Ultimately, the findings of the current study may have significant implications for future studies on media coverage of nuclear power in other developing countries.

2. Literature review

2.1. Media coverage of nuclear power

Several scholars have studied the news coverage of nuclear power. Culley et al. (2010) examined the news coverage of nuclear reactors in Georgia, U.S., by analyzing the content of news articles in two local newspapers. The analyzed results demonstrate that the majority of articles in the two local newspapers generally reflected balanced arguments. Economic and environmental benefits and risks were most frequently presented among pro- and anti-nuclear arguments, while informational text mainly focused on regulatory processes and financing (Culley et al., 2010). Another scholar, Lazic (2013), analyzed the content of news articles about the Fukushima accident in *The Los Angeles Times*, *The New York Times*, and *USA Today* to explore how U.S. newspapers explained this accident to the public. The results indicate that these articles focused most heavily on conflict, responsibility, and economic interest (Lazic, 2013). Lastly, Perko et al. (2012) conducted a content analysis of over 200 articles published in spoken and printed media in Slovenia and other countries to examine the media coverage of a nuclear event in Slovenia. The primary research question was whether a nuclear event attracts high media attention, even in the circumstance of a minor event and a transparent communication policy. The findings reveal that even a minor nuclear event will attract a large amount of media coverage and result in heated political debates (Perko et al., 2012).

Previous research on the news coverage of nuclear power is limited, primarily assessing media reporting on nuclear reactors or nuclear risks in Western countries. Very little research has addressed the news coverage of nuclear power in developing countries, such as China.

2.2. Media and policy in China

In Western nations, the mass media closely connects the public and policymakers. On one hand, media reflects public opinion, which can influence policymakers. On the other hand, the media is the main source for the public to gain information on policymakers' activities (Soroka, 2003). In contrast, in China, the primary role of the media, especially the traditional media (e.g., the Party newspaper), is to present and disseminate official policies to the public while integrating regime support (Brady, 2009; Hague and Harrop, 2010).

Before the economic reform, the media was tightly controlled by the Chinese government (Liu, 1971) and was considered the mouthpiece of the Communist Party of China (CPC) (Cheek, 1989; Liu and McCormick, 2011; Siebert et al., 1956; Stockmann and Gallagher, 2011). As part of governmental organizations, media institutions were called 'administrative units' (Chinese: *shiye danwei*) and depended on subsidies from the government (Liu and McCormick, 2011). The government's policies were disseminated to the general public by the media (Rawnsley, 2006; Shen et al., 2009). Therefore, the media in China mainly aimed to 'guide' public attitudes rather than to reflect it (Tang and Sampson, 2012).

However, some significant changes have happened to the Chinese media system since the beginning of economic reform in China in 1978 (Lee et al., 2006; Liu, 2010; Pan, 2000; Polumbaum, 1994; Stockmann and Gallagher, 2011; Sun, 2010; Wu, 2000; Zhao, 1998). Commercial interest began to influence the news (Wang, 2009; Zhao, 1998). In 1978, business management was introduced to media institutions by the State Ministry of Finance, particularly focusing on *The People's Daily* and seven other newspapers in Beijing. Although the government still provided subsidies to these media units, they were required to learn how to manage

their businesses and were responsible for their own economic circumstances to some extent (Liu and McCormick, 2011). In 1987, the General Administration of Press and Publishing (GAPP) was reestablished. Its control of media was shifted from ideological domination to more administrative regulation. Additionally, the GAPP required most newspapers to achieve financial autonomy by 1994 (Liu and McCormick, 2011). By 1998, the majority of media units had achieved financial self-reliance (Liu and McCormick, 2011). Thus, the changes in management and financing resulted in media marketization (Stockmann and Gallagher, 2011).

Driven by the market economy, the Chinese media gradually gained some financial autonomy and greater freedom in reporting the news (Chan and Qiu, 2002; Liu, 2010; Sun, 2010). Nevertheless, the Chinese media still serves largely as the mouthpiece of the Chinese central government (Stockmann and Gallagher, 2011; Zhang and Zhu, 2006; Zhao, 1998), and the Party continues to have considerable control over the programming and content of the media in China via the Central Propaganda Department and its local branches (Brady, 2006; Egorov et al., 2009; Norris and Inglehart, 2009; Stockmann, 2012; Tang and Iyengar, 2011). Specifically, the Party newspaper, which is strictly managed by the Party Committees, primarily aims to convey the official policies to the public (Murphy, 2007). Notably, *The People's Daily*, which was chosen for this study, is the most famous and influential Party newspaper at the national level in China (Murphy, 2007).

3. Method

The current study examined the news coverage of nuclear power in two prominent Chinese newspapers, *The People's Daily* and *The Guangming Daily*, from 2004 to 2013 using quantitative content analysis.

3.1. Sample

To examine the news coverage of nuclear power in China, the content of two national Chinese newspapers was analyzed in this study. *The People's Daily* was chosen for the analysis because it is a national, quite influential, authoritative newspaper in China (People's Daily Online, 2014), with a daily circulation of 2.52 million copies (Velker, 2011). Furthermore, it has an international influence, ranking in the top ten newspapers in the world according to UNESCO (People's Daily Online, 2014). It features English, French, Spanish, Japanese, Arabic, and Russian news reports in addition to Chinese editorials (W3newspapers, 2013). *The People's Daily* has also established overseas edition, releasing news in more than 80 countries and regions (People's Daily, 2014). It publishes the latest news coverage on the Chinese government's policies and major domestic and international news (People's Daily Online, 2014). Furthermore, it is the official mouthpiece of the CPC (Titterton, 2013).

The second newspaper studied, *The Guangming Daily*, is a state-owned daily newspaper in China, launched by the China Democratic League. In 1957, the Propaganda Department and the United Front Work Department (UFWD) of the Central Committee of the CPC began to run the newspaper directly. There are correspondents in many other countries for *The Guangming Daily*, which has a global circulation. As an influential newspaper with a long history, *The Guangming Daily* has a large readership and enjoys high prestige among the Chinese media (China Culture, 2014).

The two newspapers were also chosen for another significant reason, namely, their role in reporting on controversial topics featuring scientific elements to the public (Riffe et al., 2007; Vasterman et al., 2005). *The People's Daily* has a special section for reporting science and technology news (People's Daily Online,

2014). Similarly, *The Guangming Daily* is an influential newspaper concentrating on science, technology, education, and culture (China Culture, 2014).

By searching for the keyword 'Hedian' (Chinese), meaning 'Nuclear Power', in the full-text articles on the websites of *The People's Daily* and *The Guangming Daily* (Chinese version),¹ we collected electronic copies of all of the articles relating to nuclear power published in these two prominent newspapers from 2004 to 2013. We chose this period because we intend to do a decade-long analysis. Notably, the articles we selected primarily focused on nuclear power in China. Accordingly, articles about nuclear power with minimal relevance to our purpose (e.g., the second nuclear power forum between China and South Korea) were omitted. This study was not limited to news articles and also included editorials and comments (articles in the commentary section of the newspaper) because these forms also contributed to the salience of the issue in the newspapers and represented general discourse about nuclear power in China. The final sample consisted of 422 articles, of which 217 were published in *The People's Daily* and 211 were published in *The Guangming Daily*.

3.2. Coding and analysis

The coders chose the coding themes and rules in news coverage. This study has three major themes: pro-nuclear, anti-nuclear, and informational content. These three themes contain the sub-categories found in Table 1 with their respective coding rules. In addition, the coders determined each article's dominant theme, defined as the theme most frequently mentioned in the article. It should be noted that each article was exclusively coded as one subtheme.

Close reading of the news items published in the two newspapers was employed to estimate whether the articles presented pro-nuclear, anti-nuclear, or informational arguments. Pro-nuclear arguments reflected overt support for nuclear power, whereas anti-nuclear arguments reflected overt opposition to it. In contrast, informational text did not contain any overt pro- or anti-nuclear arguments, instead presenting general information about nuclear power.

Intercoder reliability was assessed in this study. Krippendorff's alpha (α) was employed in the current study because this index is applicable to any number of coders and different measurement levels of variables (e.g., nominal, ratio) (Krippendorff, 1980). Intercoder reliability in this study was assessed for three coders. In a pilot test, 63 (15% of the full sample) articles were randomly selected due to previous study that the sample size in the pilot test should not be less than 50 units or 10% of the full size sample and rarely need to more than 300 units (Lombard et al., 2002). Following the coding instrument, the three coders conducted the coding independently. After the pilot test, we refined the coding instrument. Then another 42 (10% of the full sample) articles were randomly chosen. According to the three coders' results, using an online utility that computes intercoder reliability coefficients (Freelon, 2013, 2010), Krippendorff's alpha (α) was calculated as 0.902, indicating that the intercoder reliability in this study is reasonably acceptable according to Neuendorf's (2002) conclusion that 'coefficients of 0.90 or greater would be acceptable to all, 0.80 or greater would be acceptable in most situations, and below that, there exists great disagreement' (Neuendorf, 2002, pp. 145).

¹ The website of *The People's Daily* is available at <<http://search.people.com.cn/rmwj/Gb/bkzsearch/index.jsp>>, and the website of *The Guangming Daily* is available at <<http://search.gmw.cn/advpaper.htm>>.

Table 1
Coding themes and rules for the media coverage of nuclear power.

Theme	Coding rule
(1) Pro-nuclear	Focus on overt arguments supporting nuclear power, keywords including favor, benefit, promote, positive.
Environmental benefits	Focus on arguments that nuclear power would have a negligible negative impact on the environment. Instead, it would contribute to a cleaner environment, including less carbon dioxide emission and no sewage discharge. For example: 'Compared to coal-fired plants of the same size, the Daya Bay nuclear power plant, with six nuclear power units, reduced emissions by 36.19 million tons of carbon dioxide, 350,000 tons of sulfur dioxide, and 230,000 tons of nitrogen oxides in 2012' (Shaogang Lv, February 1, 2013, <i>The People's Daily</i>).
Safety	Focus on arguments that safety can be guaranteed when developing nuclear power, including the ability to withstand natural disasters and prevent nuclear accidents. For example: 'After decades of technology advances, the safety of nuclear power plants in China is guaranteed, and it is unnecessary to worry excessively about the safety of nuclear power plants' (Yongfeng Feng, March 18, 2011, <i>The Guangming Daily</i>).
Efficiency	Focus on arguments that nuclear power is a high-density energy, able to satisfy the growing energy demand. For example: 'As a stable and efficient energy, nuclear power is an important strategy for our country to reduce its dependence on foreign energy' (Dan Bao, March 12, 2012, <i>The People's Daily</i>).
Economic benefits	Focus on arguments that developing nuclear power has economic benefits, including low transportation cost, low operation cost, tax income increase, jobs, and economic development. For example: 'Two units of the Tianwan nuclear power plant have paid RMB 2.656 billion in taxes since successively being put into commercial operation and have become the largest sources of revenue for the city' (Jinming Zheng, July 15, 2009, <i>The Guangming Daily</i>).
(2) Anti-nuclear	Focus on overt arguments opposing nuclear power, keywords including risks, concerns, danger, and harm.
Environmental risks	Focus on arguments about environmental problems relevant to nuclear power, including the leakage of radioactive materials and nuclear waste. For example: 'Nuclear waste disposal has become an obstacle to nuclear power development' (April 12, 2010, <i>The People's Daily</i>).
Safety risks	Focus on arguments that nuclear power plants may encounter safety problems during operation, including the safety risks of a nuclear accident, such as a core meltdown due to extreme natural disasters. For example: 'There are some difficulties in ensuring nuclear power safety' (Yongping Ran, December 14, 2009, <i>The People's Daily</i>).
Economic risks	Focus on arguments about the investment risks of nuclear power development, including huge initial investments. A nuclear accident may lead to substantial financial losses and a negative impact on some industries.
Health concerns	Focus on arguments about health concerns, including the concerns of nuclear power plants workers and nearby residents about the adverse health impact.
(3) Informational	Focus on general information about nuclear power with no overt pro- or anti-nuclear arguments, keywords including introduction, approval.
Planning, licensing, and supervision	Focus on general information about planning, licensing, and supervision processes in relation to nuclear power, including the fact that the government conducts nuclear planning, approves new reactors, monitors nuclear radiation, and regulates the operation of nuclear power plants. For example: 'The state council of China issued the Nuclear Safety Plan, the 12th Five-Year Plan and the 2020 Vision of Nuclear Safety and Radioactive Pollution Prevention after the Fukushima nuclear accident' (Yuehui Wu, July 4, 2013, <i>The People's Daily</i>).
Commercial nuclear power information	Focus on general information about the popularization of knowledge related to nuclear power or general information about operational commercial nuclear power plants in China and those being built, including the location, size, number of employees, financing, gross electrical capacity, and history of the operating nuclear power plants or the progress of the nuclear power plants under construction. For example: 'The total investment in the Phase II expansion project of the Qinshan nuclear power plant and the Phase I project of the Sanmen nuclear power plant reached nearly RMB 38 billion' (Guangrong Wang, July 25, 2005, <i>The Guangming Daily</i>).
Nuclear engineering technology	Focus on general information about nuclear engineering technology, including research on or demonstrations of nuclear reactors, and nuclear power production technology. For example: 'China has fully grasped uranium enrichment centrifuge technology' (Siluan Yu, June 22, 2013, <i>The People's Daily</i>).

4. Results

4.1. Overall description

Table 2 shows the percentage and number of articles presenting pro-nuclear, anti-nuclear, and informational themes in the two newspapers. The total number of relevant articles in *The People's Daily* and *The Guangming Daily* was 213 and 209, respectively, and 422 in total. Considering the two newspapers together, the informational theme was the most prevalent (77.5% or 327 articles), followed by the 'pro-nuclear' theme (21.8% or 92 articles), and then

the 'anti-nuclear' theme (0.7% or 3 articles). Of the 213 articles in *The People's Daily*, approximately 78.4% (167 articles) mainly presented informational text, approximately 20.7% (44 articles) presented pro-nuclear arguments, and approximately 0.9% (2 articles) presented anti-nuclear arguments. Of the 209 articles in *The Guangming Daily*, approximately 76.6% (160 articles) primarily focused on informational text, approximately 23% (48 articles) favored nuclear power, and only 0.5% (1 article) presented an anti-nuclear perspective.

Overall, as shown in Table 2, the majority of articles in both newspapers provided general information about nuclear power. Of the remaining articles, the number of articles favoring nuclear power is much higher than the number opposing nuclear. Accordingly, both newspapers rarely reported the adverse effects of nuclear power, primarily propagandizing the advantages instead.

Figs. 1 and 2 show the number of articles in *The People's Daily* and *The Guangming Daily* discussing pro-nuclear, anti-nuclear, and informational themes between 2004 and 2013. Overall, informational themes are more frequent than pro- or anti-nuclear themes throughout the periods from 2004 to 2013. In addition, anti-nuclear themes were published the least frequently in the two newspapers. It is noteworthy that both the total number of articles and the total

Table 2
Percentage and number of articles presenting pro-nuclear, anti-nuclear, and informational themes in each newspaper.

Newspaper	Pro-nuclear	Anti-nuclear	Informational	Total
The People's Daily	20.7% (n = 44)	0.9% (n = 2)	78.4% (n = 167)	213
The Guangming Daily	23.0% (n = 48)	0.5% (n = 1)	76.6% (n = 160)	209
Total	21.8% (n = 92)	0.7% (n = 3)	77.5% (n = 327)	422

Note: Values indicate the percentage of articles presenting each theme. Values within parentheses indicate the number of articles presenting each theme.

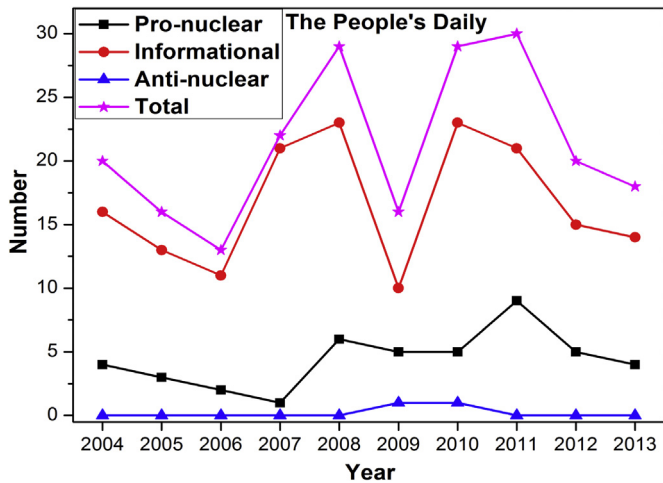


Fig. 1. Number of articles in *The People's Daily* presenting pro-nuclear, anti-nuclear, and informational themes from 2004 to 2013.

number of pro-nuclear articles in *The People's Daily* peaked in 2011, while the total number of articles and the total number of informational articles in *The Guangming Daily* peaked in 2008, indicating that a large amount of media coverage on nuclear power appeared in 2008 and 2011. The 2011 peak in media coverage on nuclear power in *The People's Daily* may be attributed to the Fukushima nuclear disaster in Japan, which attracted high media attention. On the other hand, the large amount of reporting on nuclear power in *The Guangming Daily* in 2008 may be a result of the approval of the Chinese government's nuclear power policies at the end of 2007, including the Medium- and Long-term Nuclear Power Development Plan (2005–2020), which was approved by the State Council of China in October 2007, and the white paper, *China's Energy Conditions and Policies*, which was issued by the Information Office of the State Council in December 2007. Because these policies were issued at the end of 2007, the media paid more attention to nuclear power in the next year. As shown in Fig. 1, media reports on nuclear power decreased from 2011 to 2013 because the Chinese government's expansive nuclear power plans were put on hold temporarily after the Fukushima accident, leading to moderate

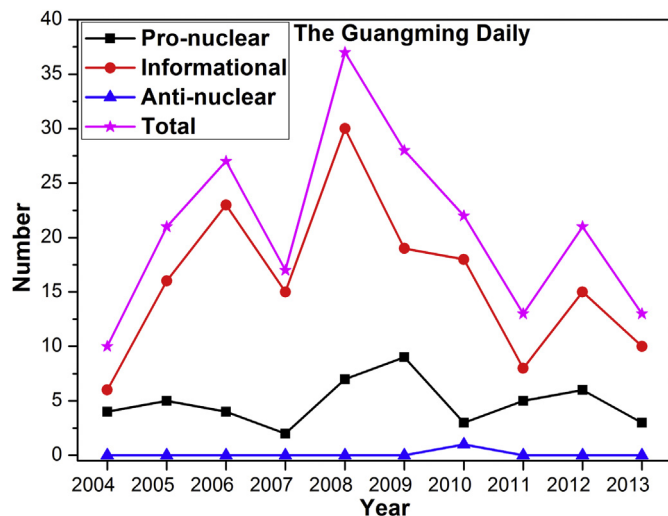


Fig. 2. Number of articles in *The Guangming Daily* presenting pro-nuclear, anti-nuclear, and informational themes from 2004 to 2013.

development of nuclear power instead (Richburg, 2011; Thomson, 2011).

Additionally, compared to the informational and pro-nuclear trends, the anti-nuclear trend of both newspapers remained fairly flat from 2004 to 2013, consistent with the Chinese government's pro-nuclear stance.

4.2. Thematic content

4.2.1. Pro-nuclear subthemes

Table 3 shows the number of articles presenting pro-nuclear subthemes in the two newspapers. In total, 92 articles in the two newspapers presented pro-nuclear subthemes, and the subtheme 'environmental benefits' was the most prevalent (46.7% or 43 articles), followed by 'safety' (42.4% or 39 articles), 'economic benefits' (8.7% or 8 articles), and then 'efficiency' (2.2% or 2 articles). Of the 44 articles presenting pro-nuclear arguments in *The People's Daily*, 52.3% (23 articles) focused on 'environmental benefits,' 40.9% (18 articles) primarily concentrated on 'safety,' 4.5% (2 articles) were coded as 'economic benefits,' and only 2.3% (1 article) emphasized 'efficiency'. Of the 48 articles reflecting the pro-nuclear perspective in *The Guangming Daily*, 41.7% (20 articles) favored 'environmental benefits,' 43.8% (21 articles) primarily emphasized 'safety,' 12.5% (6 articles) focused on 'economic benefits,' and only 2.1% (1 article) was coded as 'efficiency'.

Figs. 3 and 4 show the number of articles presenting pro-nuclear subthemes from 2004 to 2013 in *The People's Daily* and *The Guangming Daily*, respectively. It should be noted that the highest prevalence of the subtheme 'safety' in both newspapers appeared in 2011 as a result of the Fukushima accident, which occurred in Japan in 2011. In response to the accident, the Chinese government carried out a comprehensive inspection on the safety of all nuclear power plants in China. Because nuclear safety became the public's top concern after the accident (Reuters, 2011), a large number of media reports addressed nuclear safety in 2011. 'Environmental benefits' was more frequently emphasized than 'economic benefits' or 'efficiency' in the two newspapers from 2004 to 2013, which in accordance with the Chinese government's standpoint that nuclear power is a clean energy resource. Environmental benefits have also been frequently emphasized in the Chinese government's nuclear power policies, such as the Medium- and Long-term Nuclear Power Development Plan (2005–2020), *China's Energy Conditions and Policies* (2007), and *China's Energy Policy* (2012).

4.2.2. Anti-nuclear subthemes

Table 4 shows the number of articles presenting anti-nuclear subthemes in the two newspapers. Taking the two newspapers together, only 3 articles published anti-nuclear arguments. Of the 3

Table 3
Percentage and number of articles presenting pro-nuclear subthemes in each newspaper.

Newspaper	Number of articles presenting pro-nuclear subthemes				
	Environmental benefits	Safety and security	Efficiency	Economic benefits	Total
The People's Daily	52.3% (n = 23)	40.9% (n = 18)	2.3% (n = 1)	4.5% (n = 2)	44
The Guangming Daily	41.7% (n = 20)	43.8% (n = 21)	2.1% (n = 1)	12.5% (n = 6)	48
Total	46.7% (n = 43)	42.4% (n = 39)	2.2% (n = 2)	8.7% (n = 8)	92

Note: Values indicate the percentage of articles presenting pro-nuclear subthemes. Values within parentheses indicate the number of articles presenting pro-nuclear subthemes.

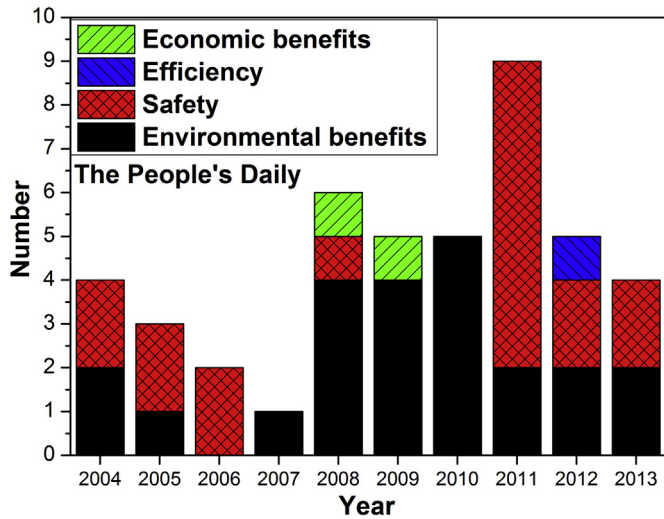


Fig. 3. Number of articles in *The People's Daily* presenting pro-nuclear subthemes between 2004 and 2013.

articles, 2 articles focused on environmental risks and 1 on safety risks. Furthermore, no articles focused on investment risks or health concerns in the two newspapers, indicating that the negative effects of nuclear power received little attention in the mainstream Chinese newspapers.

4.2.3. Informational subthemes

Table 5 shows the percentage and number of articles presenting informational subthemes in each newspaper. Taking the two newspapers together, 327 articles discussed informational subthemes. As shown in Table 5, 'commercial nuclear power information' was most frequently presented subtheme in the two newspapers (69.4% or 227 articles), followed by 'nuclear engineering technology' (19.9% or 65 articles), and then 'planning, licensing, and supervision' (10.7% or 35 articles). Of the 167 articles reflecting informational text in *The People's Daily*, 62.9% (105 articles) focused on 'commercial nuclear power information,' 25.1% (42 articles) focused on 'nuclear engineering technology,' and 12% (20 articles) focused on 'planning, licensing and supervision'. Of the 160

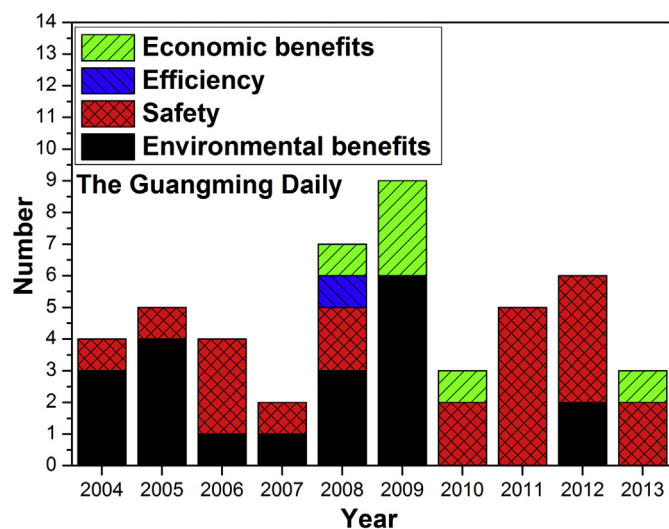


Fig. 4. Number of articles in *The Guangming Daily* presenting pro-nuclear subthemes between 2004 and 2013.

Table 4

Number of articles presenting anti-nuclear subthemes in each newspaper.

Anti-nuclear subthemes	Number of articles presenting anti-nuclear subthemes		
	The People's daily	The Guangming daily	Total
Environmental risks	1	1	2
Safety risks	1	0	1
Economic risks	0	0	0
Health concerns	0	0	0
Total	2	1	3

articles in *The Guangming Daily*, 76.3% (122 articles) concentrated on 'commercial nuclear power information,' 14.4% (23 articles) emphasized 'nuclear engineering technology,' and 9.4% (15 articles) concerned 'planning, licensing, and supervision'.

Figs. 5 and 6 show the number of articles discussing informational subthemes in *The People's Daily* and *The Guangming Daily*, respectively, between 2004 and 2013. The number of articles relating to commercial nuclear power information peaked in 2008 in both two newspapers, while articles discussing nuclear engineering technology were most common between 2008 and 2013, which may be attributed to the approval of the Medium- and Long-term Nuclear Power Development Plan (2005–2020) in October 2007. This plan emphasized the innovation of nuclear technology; described the development of several key nuclear engineering technologies, such as the China Experimental Fast Reactor (CEFR) and high-temperature gas cooled reactor; and declared that when utilizing advanced technologies and experiences from other countries, China should focus on self-design, self-construction, and innovation and should construct advanced nuclear power plants in batches (State Council of China, 2007).

In addition, the number of articles concerning 'planning, licensing, and supervision' in the two newspapers remained consistently relatively low between 2004 and 2013, indicating that the Chinese government should provide more detailed information about the nuclear-power-related planning and regulation processes to the public.

5. Discussion

We examined news coverage of nuclear power in China. To our knowledge, this is the first study to employ empirical content analysis to examine how the media has portrayed nuclear power in China. Given the Chinese government's pro-nuclear policies, which call for constructing more new reactors, our analysis is quite timely. The findings of this study reveal that the overwhelming majority of articles in both newspapers were dedicated to informational text. Regarding the opinion pieces, both newspapers generally published

Table 5

Percentage and number of articles presenting informational subthemes in each newspaper.

Newspaper	Number of articles presenting informational subthemes			
	Planning, licensing, and supervision	Commercial nuclear power information	Nuclear engineering technology	Total
The People's Daily	10.7% (n = 35)	62.9% (n = 105)	25.1% (n = 42)	167
The Guangming Daily	9.4% (n = 15)	76.3% (n = 122)	14.4% (n = 23)	160
Total	10.7% (n = 35)	69.4% (n = 227)	19.9% (n = 65)	327

Note: Values indicate the percentage of articles presenting informational subthemes. Values within parentheses indicate the number of articles presenting informational subthemes.

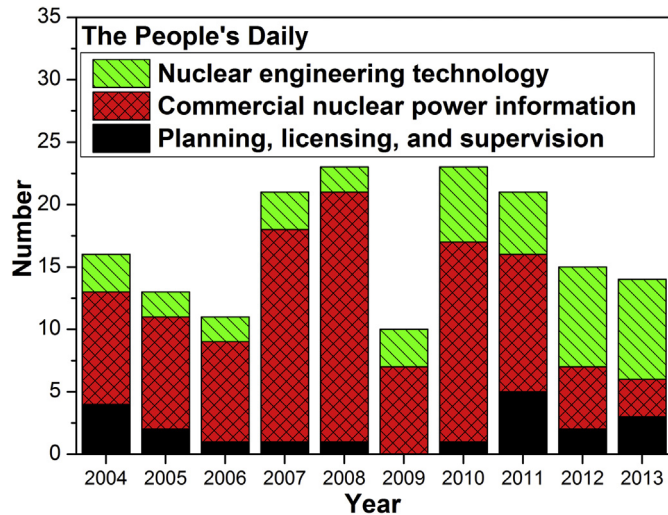


Fig. 5. Number of articles in *The People's Daily* presenting informational subthemes from 2004 to 2013.

pro-nuclear arguments, whereas few anti-nuclear opinions were presented, which is consistent with previous studies on news coverage of the benefits or problems surrounding nuclear power. Previous studies typically ignored potential risks in relation to nuclear power, focusing instead on the benefits resulting from advanced technology (Gamson and Modigliani, 1989; Singer and Endreny, 1993). Some explanations of the findings, the limitations of this study, and future directions are discussed here.

5.1. Explanations of the findings

Overall, the content analysis results are in accordance with the Chinese government's nuclear power policies. It may be assumed that pro-nuclear arguments were more frequently presented than anti-nuclear arguments because of the Chinese government's attitudes toward nuclear power. Government agencies, the nuclear power industry, and research institutions are the primary actors of the nuclear power program in China (Zhou, 2011).

Furthermore, government organizations play a vital role in developing nuclear power policies (Zhou, 2011). Consistent with

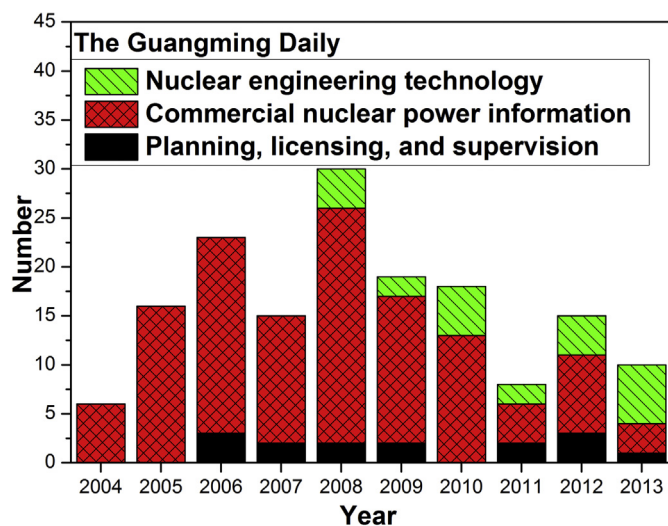


Fig. 6. Number of articles in *The Guangming Daily* presenting informational subthemes from 2004 to 2013.

the government's policy preferences, to mobilize public support, the two newspapers published more articles favoring nuclear power because the main role of the media in China, especially the mainstream media, is to disseminate the government's policies to the general public (Rawnsley, 2006; Shen et al., 2009). Thus, the results suggest a potential link between the two newspapers' reports and the Chinese government's nuclear power policies. The Chinese government primarily controls what the mainstream newspapers report.

The most salient arguments for pro-nuclear subthemes focus on 'environmental benefits' and 'safety'. These results remain to be explained. 'Environmental benefits' was the most frequently presenting pro-nuclear subtheme in both newspapers, which is in accordance with the Chinese government's standpoint that developing nuclear power can help decrease environmental pollution and fight climate change. Therefore, the environmental benefits of nuclear power have been highlighted in the Chinese government's nuclear power policies. Climate change has become a global issue. Policymakers worldwide are considering replacing fossil-fuel-intensive energy sources because fossil fuel consumption contributes strongly to global climate change (Intergovernmental Panel on Climate Change, 2007). After rapid economic development and unchecked industrial growth, the concomitant worsening of environmental pollution has become one of the most severe challenges for China in recent years (Tilt and Xiao, 2010). In 2001, according to the World Bank's report, 16 of the 20 most polluted cities in the world were in China (Economy, 2004). In 2007, surpassing the United States, China became the world's largest emitter of CO₂ (Vidal and Adam, 2007), which may be attributed to the fact that over 80% of the electricity in China is generated from coal, which emits large amounts of greenhouse gases (Hou et al., 2011). 'Burning coal contributes to 90% of the national total sulfur dioxide (SO₂) emissions, about 70% of the national total dust, nitrogen oxide (NO_x) emissions and carbon dioxide (CO₂) emissions' (Zhang, 2007).

To address environmental pollution, the Chinese government recognized nuclear power's potential benefits for the environment and climate change amelioration and therefore advocates a rapid expansion of nuclear power. According to the nuclear power policies, nuclear power is considered an alternative to burning coal. However, considering the general lack of environmental concern among the Chinese public (Zhao, 2012), to mobilize and improve public support, the two newspapers' reports focused more on environmental benefits to inform the public that nuclear power is beneficial for the environment and is the obvious solution to climate change.

Meanwhile, the Chinese government has always ranked nuclear safety as the top priority of nuclear power policies. Ensuring nuclear safety is the primary issue in nuclear power development. It is noteworthy that the subtheme 'safety' was most prevalent in 2011 in both newspapers, which may be attributed to the 2011 Fukushima nuclear disaster in Japan. Previous studies have demonstrated that even minor nuclear incidents result in significant media attention (Perko et al., 2012). Indeed, the nuclear incident in Japan drew media attention immediately and prompted wide coverage in Chinese newspapers (Thomson, 2011). Consequently, the nuclear accident was the main contributor to the increase in media coverage. This accident also attracted considerable attention from policymakers. China's Energy Policy (2012) declared that a comprehensive review concentrating on the safety of all domestic nuclear power plants was conducted after the Fukushima accident, and the inspection results revealed that nuclear power plants in China are safe (Xinhua News Agency, 2012). Notably, the Chinese public, knowing little about nuclear power, suddenly began to be concerned about nuclear safety issues and required the

government to provide more detailed information about the operation and construction of nuclear power plants in China (Tatlow, 2011; Thomson, 2011). Therefore, the two newspapers attempts to assure the public that the nuclear power plants in China are safe. The increase in the volume of safety arguments also reflects the government's tendency to ease the public's worries about the potential risks associated with nuclear power, as policymakers would lack motivation to take an action on an issue such as nuclear power without public support despite the relevant scientific evidence (Stoutenborough et al., 2013).

Policymakers need to rely on public support to legitimize their policy choices (Stoutenborough et al., 2013). Considering that news media primarily provide information about a social issue and directly and indirectly influence public perception (Soroka et al., 2013; Vreese et al., 2011), to gain the public's confidence, few anti-nuclear opinion pieces were presented in the two newspapers. For instance, few articles addressed the public's main concerns, such as radiation effects, nuclear waste disposal risks, and health problems related to nuclear power (Culley and Angelique, 2011; IEER, 2006; MIT, 2003). News coverage is thought to encourage specific audiences to think, perceive, and believe in a particular way (Entman, 2007); therefore, providing one-sided information (little negative impact of nuclear power was published) impedes a full and balanced debate.

With regard to the informational theme, it is perhaps not surprising to find that 'commercial nuclear power information' was the most common subtheme in both newspapers. The Chinese public has limited access to information about nuclear power (e.g., the location, size, and history of nuclear power plants); thus, the media provides the main source of information for the public. It is clear that knowledge has a significant impact on public perceptions of issues such as the nuclear power debate (Stoutenborough et al., 2013). To facilitate public understanding of nuclear power, the two newspapers placed more emphasis on commercial nuclear power information.

In addition, a large number of articles focused on nuclear engineering technology because the media intends to broadcast breakthroughs in nuclear engineering technology in China to the public to convince the public that China has the ability to develop nuclear power independently and ensure the nuclear reactors' safe operation in China. This is also in accordance with the Chinese government's nuclear power policy, which emphasized the innovation, self-design, and self-construction of nuclear technology (State Council of China, 2007). Additionally, the subtheme 'planning, licensing, and supervision' was also emphasized, which may be attributed to China's active development of nuclear reactors and the large number of such reactors under construction, which necessarily involves increased government intervention. Given that the regulation of nuclear power development is not yet fully developed in China, the Chinese government is now trying to formulate a complete set of rules for nuclear power development.

Lastly, it is necessary to analyze informational text in depth, and the articles in both newspapers were largely informational. Informational text largely appeared 'neutral', such as commercial nuclear power information. Nonetheless, deeper analysis of the informational text reveals that the representation of the breakthroughs and innovations of nuclear engineering technology benefited pro-nuclear interests. The Chinese government is extremely encouraging of technology innovation and advocates domestic self-design and self-construction as well as self-operation (Ottinger and Feng, 2013). This illustrates a more favorable prospect of nuclear power and seems to encourage the public believe that developing nuclear power is inevitable. This finding further proves that the media serves more powerful interests and marginalizes dissenting views. Thus, a balanced and complete debate about

nuclear power was inevitably prohibited by providing one-sided information.

5.2. Limitations and future directions

In addition to its significant findings, this study has some limitations. First, this study only used two state-owned newspapers to examine the media coverage of nuclear power in China. Future research should focus on more types of media (e.g., non-state-run newspapers and the Internet) to examine news coverage of nuclear power. In addition, future research should include more comparative analyses of news coverage on nuclear power between the Chinese media and international media sources, which would provide more complete perspectives and additional insights into this issue. Second, we examined the news coverage during a 10-year period. In the future, more longitudinal analyses are needed. Furthermore, future research may benefit from avoiding dichotomous coding, such as pro- or anti-nuclear word usage, as used in this study, directly focusing on the article content and variability of data instead. Overall, future researchers need to contribute to additional research on news coverage of nuclear power in developing countries, such as China.

5.3. Policy implications

Some policy recommendations are provided in this study. First, according to the content analysis results, media coverage is a potential enhancing factor for promoting the Chinese government's nuclear power policies. Because the media has an important impact on public perception, the Chinese government focuses on a favorable and prosperous policy environment, which is beneficial for promoting and implementing its nuclear power policies. Second, the improvement of public awareness and the importance of public opinion for the Chinese government to create policies in the near future require open and reliable media coverage. Although the central government remains in charge of determining the final decision on such policies, the public or one of the multiple competing interests in China can contest the policy-making process, especially in the area of nuclear power (Xu, 2008). Therefore, the government should provide more details about nuclear power to the public, such as regulatory safety standards, nuclear waste disposal, nuclear reactor decommissioning, spent fuel storage, and reprocessing. Moreover, newspapers should not only publish one-sided debates on controversial issues. Specifically, nuclear power has been a highly controversial issue for several years (Thomson, 2011). Given the complexity and urgency relevant to nuclear power, a complete and balanced debate is desirable. Finally, it is essential to strengthen reporters' professional knowledge related to nuclear power and enhance communication between journalists and nuclear experts to provide authoritative, useful, and specific information to the public.

6. Conclusion

With respect to nuclear power, previous research has concentrated on developed countries. This study applied content analysis to examine the media coverage of nuclear power in China using two prominent Chinese newspapers, *The People's Daily* and *The Guangming Daily*, from 2004 to 2013. The content analysis results show that for both newspapers, almost all of the articles presented informational or pro-nuclear statements, whereas little anti-nuclear opinion was expressed. Environmental benefits and safety were the most used concepts among nuclear power supporters. In contrast, nuclear power opponents' arguments focused on environmental and safety risks. Notably, pro-nuclear arguments

concerning environmental benefits were among the most represented, whereas anti-nuclear arguments were among the least represented. Informational subthemes were more prevalent than pro- and anti-nuclear subthemes. The overwhelming majority of articles with informational subthemes were devoted to commercial nuclear power information, followed by nuclear engineering technology. However, by analyzing the information about nuclear engineering technology in depth, we find that most of the articles emphasized the breakthroughs, independent design, and self-construction of nuclear engineering in China, providing a favorable impression of nuclear power. Briefly, the findings in this present study are in accordance with the Chinese government's nuclear power policies.

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