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# Hydraulic Fracturing In the United States: A Framing Analysis

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# Hydraulic Fracturing in the United States:
# A Framing Analysis

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# DEDICATION

To my parents, with love and gratitude, Sherry and Jeff Goodman & Ken and Penny Cardell. Thanks for a lifetime of encouragement; without each of you this accomplishment would not have been possible.

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# ABSTRACT

This research considers the issue of hydraulic fracturing, a controversial method of extracting natural gas from shale and coal deposits. The technology, commonly referred to as "fracking," has only been employed on an industrial scale since the late 1990s and is increasingly becoming the focus of news coverage. In this thesis research, a representative sample of both national and regional newspaper coverage on the issue of hydraulic fracturing is analyzed, looking at several key elements of framing. This study also examines differences in issue framing between the national elite press and regional news sources, as well as based upon partisanship. The analysis found that hydraulic fracturing tends to be framed as an issue of technological uncertainty, economic impact, or public accountability/governance, within both national and regional news coverage. Within the discourse, support for fracking is most often described in terms of economic benefit, whereas opposition to fracking is largely expressed through concerns over ecological damage and the lack of political/regulatory oversight. Further, findings suggest the tone of fracking stories has primarily been positive at both the national and regional levels, as well as among both liberal and conservative leaning new sources.

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# CHAPTER 1

# INTRODUCTION

With the rapid depletion of global petroleum reserves, the search for alternate sources of energy has intensified. In the US, with oil and natural gas production from conventional deposits leveling off, much focus has been placed on the production of petroleum resources from unconventional hydrocarbon reservoirs. Hydraulic fracturing, often referred to as "fracking," a recent development in well drilling technology, allows energy companies to tap underground reserves of hydrocarbon rich shale previously considered too expensive to extract (Heinberg & Post Carbon Institute, 2013; Mathur & Hasset, 2013).

Over the past decade, oil and natural gas produced from shale deposits have significantly increased domestic petroleum production totals. The U.S. Energy Information Administration estimates that U.S. natural gas production from shale deposits will more than double from 14 trillion cubic feet in 2015 to 29 trillion cubic feet in 2040, while crude oil production from shale deposits will increase from 4.2 million barrels per day in 2017 (25% of total U.S. crude oil production) to nearly 7.1 million barrels per day in 2040 (35% of total U.S. crude production), production increases made possible by hydraulic fracturing technology (U.S. Energy Information Administration, 2017).

The economic benefits of oil and natural gas produced from shale are numerous. According to research published by the Oxford Institute for Energy Studies, in 2011 the

US produced 8,500,983 million cubic feet of natural gas from shale gas wells, representing a value of approximately $36 billion (Hassett & Mathur, 2013). According to a study examining the economic impact of the shale gas industry in the US, 600,000 jobs were supported by the shale gas industry in 2010, and current predictions suggest that number will increase to 870,000 in 2015, and to over 1.6 million by 2035 (IHS, 2011). According to the U.S. Department of Energy, the increased domestic supply of natural gas has helped reduce the need to rely on imports, thereby enhancing U.S. energy security (Fossil Energy Research, 2012).

With the promise of an abundant new energy source, the widespread use of fracking to extract hydrocarbon resources from the earth has become commonplace over the past two decades. The process involves drilling a vertical well-shaft for several kilometers in order to reach hydrocarbon rich shale and coal deposits deep within the earth. Upon reaching the deposits, drilling continues in a horizontal direction for up to two kilometers. Large quantities of water, sand and specialized chemicals are mixed to create a slurry, known as fracturing fluid, which is then pumped into the shale deposits at pressures sufficient to fracture the hydrocarbon rich geologic formations, allowing the release of trapped gas or oil (Hydraulic Fracturing, 2012). In order to extract the gas or oil from the well, the fracturing fluid must first be pumped back to the surface. A single gas production well may undergo this process several times, requiring from 500,000 to 6 million gallons of water and producing an equal amount of fracturing fluid as waste. Wastewater often contains various toxic materials found within the shale deposit, such as arsenic, barium, and naturally occurring radioactive materials such as uranium, radium, and radon. This wastewater product is often stored onsite, in large plastic lined

containment ponds, before being transported to a wastewater treatment facility or disposed of in underground wells (Rozell & Reaven, 2012).

The environmental consequences of fracking had not yet begun to be realized until the 1990s, when fracking was undertaken on a commercial scale. Reports of groundwater contaminated with fracturing fluid became commonplace (Tiemann & Vann, 2011). Concerns over air quality near natural gas mines (Colborn, Schultz, Herrick, & Kwiatkowski, 2012), damage to ecosystems and wildlife (Bamberger & Oswald, 2012), as well as indications of increased seismic activity near gas wells were voiced (Frohlich, 2012).

In 2010, the Environmental Protection Agency (EPA), in response to public concern over changes to the quality of ground water near fracking wells and wastewater disposal sites, initiated a study examining the potential human and environmental impacts of hydraulic fracturing, focused specifically on drinking water resources. In late 2016, the EPA completed a multi-year study of the effects of hydraulic fracturing on drinking water resources. The study focused on the cycle of water use during the process of hydraulic fracturing, seeking to identify points of potential impacts on drinking water resources, as well as factors which may affect the frequency or severity of potential impacts. As a result of the study, several fracking related activities were identified that were most likely to result in more frequent or more severe impacts to groundwater quality. Most of the activities identified were related to industry practices, such as the transport, storage, and disposal of hydraulic fracturing wastewater. Due to limitations in the availability of data used within the study, the EPA was unable to develop an understanding of the full scope of the severity or frequency of impacts to drinking water from hydraulic fracturing

activities, as well as being unable to provide reliable estimates of impact frequency or severity on a national scale (U.S. Environmental Protection Agency, 2016). Despite the limitations of the study's findings, the results represent the most comprehensive scientific investigation into the contributing factors to groundwater contamination as a result of activities related to hydraulic fracturing to date. Moreover, through the identification of the various points at which groundwater impacts were most likely to occur, the EPA study provides insight to both the fracking industry regarding the development of best practices, as well as to legislators in providing a scientific basis for the development of effective regulations of fracking industry practices.

Hydraulic fracturing has been the subject of much proposed legislation at both the state and federal levels. In 2011, the Fracturing Responsibility and Awareness of Chemicals Act, commonly referred to as the FRAC act, was introduced into both houses of Congress (Negro, 2012; Pless, 2012). The proposed legislation was an attempt to repeal the Energy Policy Act of 2005, which would have given the EPA the authority to regulate hydraulic fracturing. The FRAC act would also have required energy companies to publicly disclose a list of chemicals used in hydraulic fracturing (Negro, 2012). The FRAC act, while sparking much debate, was largely unpopular among members of congress and failed to pass (Burford, 2012; Wilber, 2012).

As of 2012, 137 bills in 24 states have been introduced pertaining to hydraulic fracturing (Pless, 2012). Several states have introduced bills requiring energy companies to disclose a list of chemicals used in fracking fluid, as well as stipulating regulations regarding proper disposal of fracking wastewater. Several states have introduced bills attempting to ban fracking or suggesting moratoria on fracking pending the completion of

the EPA study in 2014 (Pless, 2011). Other legislation has sought to address a variety of issues such as potential threats to air and water quality, increased land use, and well construction near residential areas (Pless, 2011).

At the federal level, fracking is largely unregulated, although the EPA is involved, to a limited extent in the regulation of fracking through the Safe Drinking Water Act (SDWA). Under the Energy Policy Act of 2005, hydraulic fracturing was made exempt from EPA regulation, except in cases in which diesel fuel is used as a hydraulic fracturing agent, thereby both limiting the power of the EPA to regulate fracking, as well as leaving the task of regulation with the individual states (Burford, 2012; Negro, 2012).

Traditionally, states handle the regulation of the oil and gas industry. Due to the rapid expansion of hydraulic fracturing activities, states have been burdened with the task of developing regulatory strategies, attempting to balance environmental safely and human health risks against pressure from those within the oil and gas industry seeking to develop a newly abundant energy resource (Burford, 2012). Some states, such as New York and Delaware, have limited or imposed moratoria on fracking so as to consider the costs and benefits of hydraulic fracturing. Other states, such as West Virginia, have chosen to enact emergency rules to regulate the industry, while working on more comprehensive long-term regulations (Negro, 2012).

The potential for federal and state regulatory overlap has served to significantly complicate industry regulation. In order for a state to self-regulate fracking industry activities, it must first submit to the EPA a list of regulatory requirements demonstrating that the state's requirements are at least as stringent as those of the EPA. Once a state is allowed to self-regulate, any attempt to impose federal regulations under the SDWA

would be considered duplicative and unnecessarily costly, thus serving to form the basis of a lawsuit (Burford, 2012; Negro, 2012).

Documentary films, focusing on issues such as the perceived lack of industry regulation and the potential for environmental damage caused by fracking, have served to promote awareness of hydraulic fracturing among a national audience. In 2010, the Academy Award nominated documentary GasLand, focusing on the potential negative effects of fracking, was the source of much controversy (Fox, 2010). A second documentary, FrackNation, was released in January 2013, as a means to refute the claims made by GasLand, further fueling both media and public controversy (McAleer, 2013). These films were followed by GasLand 2, which attempts to connect hydraulic fracturing to the ongoing global warming debate (Fox, 2013). Documentaries, such as Gasland, provided news media outlets with a source of dramatic images, such as footage of burning tap water, which was often included during reports on fracking. Moreover, these documentaries brought focus to the fact that there is little scientific understanding as to the long-term consequences of the implementation of hydraulic fracturing on a large scale (Vasi, Walker, Johnson, & Tan, 2015).

The mainstream news media play a particularly influential role, affecting public opinion and, consequently, policy decisions (Scheufele, 1999). The potential to influence public opinion on controversial scientific issues, by emphasizing positive or negative aspects of an issue, allows the media to play a role in determining public support for specific issue related policies (de Vreese & Boomgaarden, 2003). News reports of science and technology issues, such as hydraulic fracturing, have an even greater

potential to influence public opinion, as most people tend to lack other sources of expert information to help them make sense of an issue (Priest & Ten Eyck, 2003).

This study seeks to understand how the issue of hydraulic fracturing is portrayed within the American news media, using quantitative content analysis to analyze news reports from both national and regional newspapers, as a means of understanding the ways in which stories on hydraulic fracturing are structured. In so doing, this thesis research attempts to address a gap within the literature regarding the way the issue of hydraulic fracturing has been framed within media coverage from the US. Using a representative random sample of newspaper articles from both the elite national press, as well as from local news media outlets, this research seeks to develop an understanding of which frames appear most often in news stories about fracking, using a typology of frames that have been found to occur consistently across the science communication literature (Nisbet, 2010). Based upon a conception of framing developed by Salma Ghanem (1997), this study employs a method of analyzing several important aspects of framing, that allows content to be categorized thematically, cognitively, as well as affectively, such that the resulting analysis measures the prevalence of issue frames (e.g. the central organizing theme of the story), issue attributes (the central arguments in a story), and the overall tone of news media content (Kim, Besley, Oh, & Kim, 2014). Through the quantitative analysis of news media content, comparisons are made between national and local new reports, as well as by news source partisanship, in order address a series of research questions and hypotheses. Thereafter, follows a discussion of the results of the analysis.

# CHAPTER 2

# FRAMING

It is a generally accepted notion that the news media play a significant role in shaping the public's perception of an issue (Gitlin, 1980). How the public understands an issue is often a result of how news media frame that particular issue. The media tend to frame an issue in a certain way, that is to say, media coverage often focuses attention on certain aspects of an issue, thereby making those aspects more salient, while giving less attention to others (Entman, 1993). As a result of this process of selective focus, or framing, specific attributions, evaluations, or decisions can be suggested to an audience, thereby leading the audience to a particular conclusion (Scheufele, 2006). In other words, the way in which a particular issue is framed within news media reportage is a contextual cue that may profoundly influence decision outcomes (Iyengar, 1991).

## 2.1 News Framing of Hydraulic Fracturing

As of yet, little scholarly attention has been given to the representation of hydraulic fracturing within the media. A review of the literature highlights the need for research on the ways in which fracking is portrayed in both national and local news media coverage in the U.S. To date, there exists only a handful of articles concerned with media frames or public perceptions associated with hydraulic fracturing.

Beresford (2014) employed content analysis to examine the ways in which fracking has been represented within media coverage, focusing on differences between the U.S. and the European Union. Beresford (2014) found there to be wide variation of

issue representation when comparing newspapers, but when grouped at the state or national level, the variation lessened considerably. What is more, results suggested that the issue of fracking is represented somewhat more negatively within the E.U as opposed to within the U.S. The study used a unique set of thematic codes, of which the author gave no explanation as to how the codes were developed. Moreover, the results of this study could be seen as lacking methodological rigor, as the author was the sole coder of the data from the study, thus, the codes could be seen as lacking representational validity.

Habib and Hinojosa (2016), used content analysis to examine the issue of hydraulic fracturing within three national U.S. newspapers. The authors coded for both the frame used within a story, as well as for story tone. The author's findings suggest that hydraulic fracturing tends to be presented by elite news outlets as an issue of conflict, responsibility and environmental concern. Water pollution was found to be the most prominently featured concern of hydraulic fracturing stories. The authors also found the overall tone of fracking articles was largely neutral, while economic benefits tended to be portrayed as positive, and environment, conflict, and responsibility tended to be portrayed more negatively. While the study relied upon a coding scheme derived from previous science communication research, the method of sampling may limit the study's generalizability, as the authors coded a disproportionately large number of articles from *The New York Times* (n=244), as compared to *The Washington Post* (n= 60), and the *Los Angeles Times* (n=60) (Habib & Hinojosa, 2016).

Blair and colleagues (2015), using content analysis, examined the perception of risks and benefits associated with hydraulic fracturing by industry representatives, environmental groups, and individuals, as represented within three Colorado newspapers,

each having different political leanings. Among other findings, the authors found that when framing the risks and benefits of hydraulic fracturing, the presentation of specific themes varied by liberal and conservative newspapers. Of the newspapers studied, considering the framing of risks and benefits, the liberal newspaper was more likely to feature the "risk to public health," whereas the conservative newspaper was more likely to feature "benefits to the economy."

Theodori (2009), surveying the residents of two counties in rural Texas, measured differences in public perception regarding various issues related to the increase in fracking activities within the local communities. Several of the issues most cited by residents were increased truck traffic, pollution (noise, water, and air), traffic accidents, odors/fumes, illegal drug use and crime. A similar survey of rural Pennsylvania residents suggested perceived benefits such as job creation, local economic growth, and increased local tax revenue, although residents also cited housing shortages, increased rental prices, and quality problems with water or environmental issues (Schafft, Borlu, & Glenna, 2013).

Boudet and colleagues (2014), using a nationally representative U.S. sample, examined public perceptions of hydraulic fracturing, examining such aspects as "top of mind" associations, issue familiarity, levels of support/opposition, as well as predictors of such judgements. The author's findings, similar to those of other emerging technologies, suggested that respondents were generally unfamiliar with the process of fracking and its potential impacts, while also expressing considerable uncertainty as to whether to support it. The authors found that Americans, on the whole, have heard either little or nothing about hydraulic fracturing, an opinion expressed by over half of respondents. Of those

who have heard of hydraulic fracturing, many were unsure whether they support or oppose the technology. Respondents expressing an opinion in support of, or in opposition to fracking, were evenly split between the two viewpoints. Further regression results found supporters to be politically conservative, watch TV for news, and reference economic or energy supply impacts. Whereas opponents were more familiar with hydraulic fracturing, read newspapers more than once a week, and referenced environmental impacts associated with fracking.

Clarke and colleagues (2015) examined framing effects of two distinct terms used to describe the process of hydraulic fracturing: *fracking*, and *shale oil and gas extraction*. Findings suggest that when referring to the process of hydraulic fracturing, the term shale oil and gas extraction was associated with more supportive attitudes towards the energy extraction process, whereas the term fracking was associated with more negative perceptions associated with greater environmental risks.

**2.2 Frames**

According to Mathew Nisbet (2010), frames are "general organizing devices…a frame serves as a valence-neutral organizing device for arguments and interpretations (p. 45)." Noting the need for a generalizable typology for the study of framing in science issues, Nisbet (2009) compiled a frame typology consisting of a set of frames that seem to re-occur across science-related policy debates. By applying this typology of frames to the issue of fracking, news reports of hydraulic fracturing can be categorized based upon a central organizing theme, or *frame* (See Table 2.1 for a complete description of frames). In total, nine frames are used to categorize the central argument of each news article. The

following is a brief description of each frame, and examples of how each frame might be utilized within the context of news reports on hydraulic fracturing.

The first frame, *scientific/technical uncertainty,* is concerned what is known versus unknown about a technology, focusing upon the potential of certain technologies to solve problems, or upon the unknown potential of new technologies to create unforeseen problems (Nisbet, 2009a). For example, in the case of hydraulic fracturing, the technological uncertainty frame might be used to discuss issues such as the benefits of hydraulic fracturing technology being based upon the proven technology of conventional oil extraction, or to discuss the various unknown outcomes of using a complex technology in a new way.

The second frame, *economic impact,* might be represented in a story discussing various economic outcomes of hydraulic fracturing endeavors on global, national, regional or local levels (Nisbet & Scheufele, 2009). When discussing the issue of hydraulic fracturing, the economic impact frame may be used to discuss the potential economic benefits of fracking, or perhaps in discussing the competitive nature of investing in conventional energy markets, facilitated by the abundance of natural gas as a result of hydraulic fracturing.

The third frame, *public accountability/governance* may be used to communicate issues of regulatory or legislative control, such as calling for or criticizing governmental involvement in the decision-making process concerning rules, regulations, or issues of jurisdiction (Nisbet, 2009a). On the issue of fracking, news stories using this frame may focus on the need for increased regulation within the fracking industry, or, conversely,

may focus on the ways in which current regulations serve to sufficiently regulate the petroleum industry.

A fourth frame, *public opinion/engagement,* is often used to provide information intended to inform, influence public opinion, or garner support. This frame tends to focus on information such as poll results, or on the perspectives of activists or laypersons, providing information such as opinion or personal narrative. For example, this type of story might focus on informing the public as a way to either ease their concerns, such as providing poll results indicating public approval of fracking, or to raise alarm, such as interviews with laypersons describing contractual abuses by energy companies (Nisbet, Brossard, & Kroepsch, 2003; Nisbet, 2009a; Nisbet, 2009b). This frame, while not part of Nisbet's final typology of frames, was selected for inclusion due to the level of grass-roots activism surrounding the issue of fracking. The frame was developed from a previous science communication study on the framing of stem-cell research (Nisbet et al., 2003).

The fifth frame, *social progress,* is concerned with improving quality of life or solutions to social problems (Nisbet & Scheufele, 2009). A news story using this frame might discuss the environmental or political implications of a newfound abundance of clean burning energy, made possible by hydraulic fracturing. Alternatively, the social progress frame may be used to describe a condition of sustainability, or harmony with nature, as opposed to mastery over nature.

Another frame, m*iddle way/alternative path*, is concerned with finding a possible compromise position or a third way between conflicting viewpoints (Nisbet, 2010). For

example, this type of story might propose limitations on hydraulic fracturing, such as limiting the number of well sites as an alternative to a ban on fracking.

A story using the seventh frame, *morality/ethics,* will involve reasons why hydraulic fracturing is either right or wrong (Nisbet, 2010). This type of story might suggest that hydraulic fracturing is morally wrong, as the short-term economic benefits from hydraulic fracturing will not outweigh the long-term negative impacts that future generations will be left to deal with. Conversely, it may describe moratoria on fracking as being morally wrong, due to the limits placed on the availability of cleaner burning energy sources such as natural gas, as opposed to coal or nuclear.

The eighth frame, *Pandora's box/runaway science,* is concerned with the potential for catastrophe as a result of a technology becoming out-of-control (Nisbet & Scheufele, 2009). News stories using this frame might discuss the issue of hydraulic fracturing in terms of irreversible outcomes, or the limits beyond which the potential for unknown dangers is realized.

A final frame, *conflict/strategy,* involves the competition of elites in winning a debate. The focus of this type of story is not on policy, but on the strategy. News stories may focus on the actions or deliberations of political figures, government agencies or political lobbies, as well as on the tactics of strategic actors. Typically journalist driven, a conflict/strategy story on hydraulic fracturing might describe the struggle between energy industry elites, federal regulatory agencies and environmental lobbyists, describing the tactics and strategies used within the conflict, while also focusing on who is winning or losing the competition (Nisbet et al., 2003; Nisbet, 2009).

In order to understand which frames appear more often in news coverage on hydraulic fracturing, the following research question is posed:

RQ1: How are news stories on hydraulic fracturing typically represented? Which frames appear most often within news coverage of hydraulic fracturing?

Understanding how representations of an emerging technology with environmental implications, such as hydraulic fracturing, differs within national and local news media coverage is especially important. Previous research, examining how the issue of biotechnology has been framed at both the national and local levels, suggests that, in the US, coverage of technical issues by the elite national press are often influenced by information subsidies provided by large corporations and newswires. Conversely, local news content frequently presents a greater diversity of viewpoints, as local news coverage often considers how a technology impacts a specific region, details of which may not be considered newsworthy by the national press (Priest & Ten Eyck, 2003). Therefore, it is likely that the frames favored by the national press, may be dissimilar to those favored in regional news coverage within news stories about hydraulic fracturing. In order to identify potential difference in the way news stories about hydraulic fracturing are framed between national and regional newspapers, the following research question is advanced:

RQ2: Are particular frames more likely to be used within national news coverage as compared to state-level news coverage?

This study also makes a comparison between local newspaper coverage of hydraulic fracturing from two selected regions. For this purpose, news coverage from states having longstanding socioeconomic connections to the petroleum industry *(Texas*

*& Louisiana)* will be compared with news coverage from states currently experiencing rapid economic growth due to the use of hydraulic fracturing technology *(Pennsylvania & Ohio).*

The first group, consisting of Texas and Louisiana, represents the nation's two largest producers of natural gas from shale gas deposits (U.S. Energy Information Administration, 2014). Moreover, both Texas and Louisiana each have a well-established and highly productive conventional petroleum infrastructure serving as integral parts of their economic and social structures. According to a recent assessment of the economic impacts of the oil and natural gas industry, 13.6 percent of the jobs in Texas and 16.2 percent of the jobs in Louisiana were attributable to the oil and natural gas industry in 2011 (PricewaterhouseCoopers, 2013).

The second group of states selected for comparison is comprised of Pennsylvania and Ohio. Pennsylvania and Ohio are both states with an abundance of unconventional resources, as the former is situated on the highly productive Marcellus shale play, and the latter is situated on the much deeper and larger Utica shale play. The second group represents two states in which natural gas production from shale gas drilling has increased dramatically within the past several years, yet in contrast to both Texas and Louisiana, the economic contribution of the oil and natural gas industry in both Pennsylvania and Ohio is significantly less. As of 2011, just 4.7 percent of jobs in Pennsylvania and 3.9 percent of jobs in Ohio were attributable to the oil and natural gas industry (PricewaterhouseCoopers, 2013). Considering the extent to which the petroleum industry has become integrated at both the economic and sociocultural levels in the two groups selected for comparison, it is likely that newspapers from each of the selected

regions will frame the issue of hydraulic fracturing somewhat differently. Thus, the following research question is posed:

RQ3: Have certain frames appeared more often in newspapers from Texas and Louisiana as compared to newspapers from Pennsylvania and Ohio?

A comparison is also made between news sources based upon partisanship leanings, so as to identify potential differences in the way that hydraulic fracturing is framed by both conservative leaning newspapers, as well as liberal leaning newspapers. Understanding the influence of partisanship upon the production of news is another important aspect of framing to consider. Journalists use frames cognitively to make sense of information, a process guided by personal attitudes, political beliefs, and journalistic norms, which in turn, influences the way journalists frame news coverage (Scheufele, 1999). Political actors, interest groups, authorities and corporate elites, can affect the production of news frames by providing journalists with quotes or catchphrases that can influence or even define the frame in which the information is presented (Gamson & Modigliani, 1989; Scheufele, 1999). The result of these frame building influences can be seen in the types of stories selected for coverage, as well as the general tone of the stories presented.

Considering the issue of fracking, research suggests that republicans and conservatives, tend to support fossil fuel use as a part of a free-market economy, while minimizing potential risks to the environment and opposing regulatory oversight (McCright and Dunlap, 2011). It is therefore likely that, the issue of hydraulic fracturing will be represented somewhat differently by conservative news sources, as compared to news sources that are more liberal. Thus, the following research question is posed:

RQ4: How do stories about hydraulic fracturing differ between conservative and liberal newspapers regarding the use of specific frames?

### 2.3 Issue Attributes

*Cognitive* or *issue attributes* refer to the central arguments at issue in the story. Describing issue attributes, McCombs (2005) argues that news media transfer issue salience to the public by placing emphasis on certain attributes. Framing, in this sense involves selectively focusing upon aspects of a perceived reality or on particular issue attributes, "…in such a way as to promote a particular problem definition, causal interpretation, moral evaluation, and/or treatment recommendation (Entman, 1993, p. 52)." Discourse on the issue of hydraulic fracturing can contain attributes (reasons) to support the technology *(e.g. revitalization of rural economies)* or to oppose it *(e.g. potential environmental damage).* By placing emphasis on certain attributes, the media can tell the audience which aspects of an issue are important when forming opinions or making judgments (Kim, Scheufele, & Shanahan, 2002).

In an effort to develop a comprehensive understanding of the range of attributes found within the discourse of hydraulic fracturing, various sources were consulted including academic literature, books, and news articles. As a result, a range of issue attributes were identified that include economic, technological, ecological, political/regulatory, as well as local community-level attributes, both in support of and in opposition to hydraulic fracturing. The following examples represent some of the key attributes identified within the discourse of hydraulic fracturing (see Table 2.2 for a complete list of issue attributes).

Proponents of fracking, concerned with impacts on the environment have suggested that the availability of an abundant source of natural gas will provide a clean burning alternative to coal, thereby reducing overall carbon emissions *(benefit to the environment)* (Wood et al., 2011). Supporters claim hydraulic fracturing technology would benefit the economy by providing a new domestic energy source *(decreasing the dependence on foreign oil)* (Hassett & Mathur, 2013). Those in support of expanding the use of hydraulic fracturing claim that the technology is safe, as it is based upon the proven technology of conventional petroleum extraction *(fracking technology is safe)* (Nakhwa, Huggins, & Sweatman, 2013). Supporters of the fracking industry suggest that the current regulatory framework provides sufficient industry oversight, dismissing the need for increased regulation *(sufficient regulations)* (Peterson, 2016). At the local-level, community members in support of fracking cite the creation of wealth brought about through land leases with petroleum companies *(individuals benefit through land leases w/energy companies)* as a potential benefit of fracking (Ladd, 2014),

Conversely, opponents concerned with the environmental impacts of fracking cite current levels of methane leakage within the industry as being potentially more destructive as a greenhouse gas, having the potential to more than offset the reduction in carbon emissions realized through the increased use of natural gas *(contributes to global warming)* (Deaton, 2015). Opponents also claim the economic benefits of fracking would be marginal, as initial estimates of oil and gas supplies created by the technology are largely overstated *(potentially unreliable energy source)* (GE, 2011). Opponents of fracking technology argue that the technology is imperfect, citing issues with the use of toxic chemicals, and open-air wastewater storage ponds as being contributors to

environmental mishaps *(fracking technology is dangerous)* (Patterson et al., 2017). Industry opponents are also less optimistic about the current regulatory schemes governing the industry, arguing that the industry lacks sufficient oversight with regard to all aspects of the hydraulic fracturing process, citing issues with well construction, the use of dangerous chemicals, and the disposal of wastewater *(lacking political/regulatory oversight)* (Burford, 2012). At the local-level, community members opposed to fracking often protest the industrialization of the rural landscape *(rural industrialization),* citing impacts on local tourism, as well as the degradation of the inherent natural beauty of the environment (Theodori, 2009). Having developed a comprehensive understanding of the issue attributes represented within media coverage of hydraulic fracturing, the following research question is posed:

> RQ5: Which issue attributes have appeared more often in newspaper coverage than others?

As previously mentioned, in the US, the national elite press often relies upon information subsidies from large corporations and newswires when reporting on technical or science related issues, whereas local news sources tend to focus on issues relevant to local audiences, typically reporting on the ways a technological issue impacts a specific locale (Priest & Ten Eyck, 2003). Moreover, the decision to report on environmentally hazardous issues, at the local level, is typically journalist driven (Wakefield & Elliott, 2003), and citizens most commonly rely on information from local newspapers to make sense of industrial hazards and environmental health risks (McCallum, Hammond, & Covello, 1991; Wakefield & Elliott, 2003) Thus, considering the issue of hydraulic fracturing, it is likely that certain attributes will appear more often in national news

coverage, as compared to regional news coverage. A comparison of the prominence of attributes within news coverage from both national and regional newspapers is therefore important, in attempting to understand the news framing of hydraulic fracturing. Hence, the following research question:

> RQ6: How does national newspaper coverage differ from regional news coverage? Are certain attributes more likely to appear in national newspapers as compared to regional newspapers?

A comparison of the prevalence of attributes found within news reports from the two regional groupings (*Texas & Louisiana)* and *(Pennsylvania & Ohio)* is also made. Differences in the prevalence of issue attributes between the two regions is likely, especially considering the dominant historical attitudes toward both the environment and industrial expansion. For example, when oil and gas extraction began in Texas and Louisiana, attitudes toward the environment, as well as the ways in which petroleum technology interacted with the landscape were much different as compared to those more recently during the proliferation of hydraulic fracturing activities in Pennsylvania and Ohio. In Louisiana, as the oil explorations moved into the costal marshes during the 1920s, the wetlands weren't considered to be ecological commodities, but were rather viewed as "hostile territory that needed to be subdued for human benefits (Gramling & Freudenburg, 2006)," an attitude that persisted through much of the 20th century as the petroleum industry expanded throughout the states of Texas and Louisiana. In contrast, as the fracking boom has developed during the early 21st century, environmental issues, such as ozone depletion, and global warming have become paramount in the minds of many Americans. Attitudes toward the expansion of the petroleum industry have shifted

from that of industrial expansionism to include a focus upon environmentalism and ecological preservation (Gramling & Freudenburg, 2006). Therefore, in areas such as Pennsylvania and Ohio, the rapid increase in frack-well drilling, and the construction of related natural gas infrastructure, are likely to be seen as threats to local resources that currently contribute to the region's economy, such as farming and tourism. It is therefore likely that news reports of hydraulic fracturing from each of the two regions will emphasize certain attributes within news coverage over others. Thus, the following research question and two hypotheses questions are posed:

RQ7: Are certain attributes more likely to appear in news stories from *Texas* & *Louisiana* as compared to news from *Pennsylvania* & *Ohio?*

H1a: Newspapers in Texas and Louisiana will be less likely than papers in Pennsylvania and Ohio to mention *environmental damage* as an attribute.

H1b: Newspapers in Texas and Louisiana will be less likely than papers in Pennsylvania and Ohio to mention the reasons (attributes) to oppose hydraulic fracturing.

Considering public opinion on the issue of fracking, there are clear partisan divisions regarding the use of fossil fuels, as well as fracking in particular. A recent national survey found that at least seven-in-ten Republicans support the expansion of activities such as coal mining (73%), fracking (70%), and offshore drilling (76%). Conversely, the majority of Democrats are opposed to the expansion of each of these energy resources (Pew Research Center, 2016). Based upon these national survey results, it is likely that conservative leaning newspapers will portray the issue of fracking

differently than liberal leaning newspapers, with regard to the use of particular issue attributes when reporting on fracking. In order to examine the potential differences in attribute prevalence between partisan news sources, the following research question and two hypotheses questions are posed:

> RQ8 (attributes): How do stories about hydraulic fracturing differ between conservative and liberal newspapers regarding issue attributes?
>
> H2a: Liberal newspapers are more likely than conservative newspapers to mention *environmental damage* as an attribute.
>
> H2b: Conservative newspapers are more likely than liberal newspapers to mention reasons (*attributes*) to support hydraulic fracturing.

**2.4 Tone**

Story tone, or the affective aspect of media coverage, imparts to the story a positive, neutral or negative connotation. A story's *valence*, or its overall positive or negative tone contributes to issue salience (McCombs, 2005). Framing media content, by subtly suggesting a positive or negative tone of evaluation, influences individuals' overall appraisal of an issue (Druckman, 2001). Based on Einsiedel's (1992) operationalization, assessments of story tone will be categorized into pro-fracking, anti-fracking, or neutral. Thus, in order to understand the tone of hydraulic fracturing stories, the following research questions is advanced:

> RQ9 (story tone): What is the tone of hydraulic fracturing stories? Has the tone been largely positive or negative toward hydraulic fracturing?

The national news media, when reporting on technical issues, tends to rely upon information subsidies from mainstream sources such as corporations and research universities (Priest & Ten Eyck, 2003). In contrast, the content of local news tends to focus upon events that are relevant to a local readership, and would likely hold little appeal to a national audience. Thus, content from the elite press may present a more narrow range of perspectives, as compared to local news, which often presents a unique array of viewpoints (Priest & Ten Eyck, 2003; Crawley, 2007). In the case of fracking, national news may be more likely to focus on aspects of the technology that are relevant to a national audience, whereas regional newspaper may be more likely to report on local impacts of fracking technology. In order to examine differences in the tone of stories from national news sources versus regional news sources, the following research question is posed:

> RQ10: How has the tone of hydraulic fracturing stories differed between national newspaper coverage and regional newspaper coverage?

The economies of the states of both Texas and Louisiana have, for nearly a century, been heavily reliant upon the contributions of the petroleum industry. Conversely, the states of Pennsylvania and Ohio, have to a much lesser extent relied upon the economic contributions of the petroleum industry. Moreover, most of the residents of Texas and Louisiana have lived their entire lives within the proximity of petroleum extraction and refining infrastructure. On the other hand, residents of Pennsylvania and Ohio are currently having to adjust to the rapid construction and expansion of hydraulic fracturing wells, and natural gas infrastructure. Therefore, it is reasonable to conclude that the tone of news stories on hydraulic fracturing from each of the selected regions will

vary considerably. In order to gain an understanding of the differences in story tone between the two groupings, the following research question is posed:

> RQ11: How has the tone of newspaper coverage of hydraulic fracturing differed between each of the selected regions (*Texas* & *Louisiana* or *Pennsylvania* & *Ohio)?*

Finally, a comparison is made between liberal and conservative news sources regarding story tone. Previous research suggests partisanship may have some influence upon attitudes toward energy or environmental issues, finding, in the case of fracking, conservatives and Republicans are more supportive of the issue than liberals and Democrats (Boudet et al., 2014; Blair, Weible, Heikkila, & McCormack, 2015). Further, considering that Republicans and conservatives tend to support the use of fossil fuels to a much greater extent compared to liberals and Democrats, while also tending to downplay the environmental risks, and the need for regulatory oversight (McCright and Dunlap, 2011), it is likely that the tone of news stories of hydraulic fracturing will differ based upon newspaper partisanship leanings. Hence, the following research question and hypothesis question are posed:

> RQ12: How has newspaper coverage of hydraulic fracturing differed between liberal leaning newspapers as compared to conservative leaning newspapers?

> H3: The tone of hydraulic fracturing stories in conservative newspapers will be more positive than stories in liberal newspapers.

*Table 2.1 - Description of Frames*

| | |
|---|---|
| Scientific/technical uncertainty | …a matter of expert understanding; what is known versus unknown; either invokes or undermines expert consensus, calls on the authority of "sound science," falsifiability, or peer-review. |
| Economic development/competitiveness | …economic investment, market benefits or risks; local, national, or global competitiveness. |
| Public accountability/governance | …research in the public good or serving private interests; a matter of ownership, control, and/or patenting of research, or responsible use or abuse of science in decision-making, "politicization," |
| Public Opinion/ Engagement/ Education[1] | …information intended to inform, garner support, or influence public opinion Focus on poll results, layperson perspective, activist… |
| Social progress | …improving quality of life, or solution to problems. Alternative interpretation as harmony with nature instead of mastery, "sustainability." |
| Morality/ethics | …in terms of right or wrong; respecting or crossing limits, thresholds, or boundaries |
| Pandora's box / Frankenstein's monster / runaway science | …call for precaution in face of possible impacts or catastrophe. Out-of-control, a Frankenstein's monster, or as fatalism, i.e. action is futile, path is chosen, no turning back |
| Middle way/alternative path | …around finding a possible compromise position, or a third way between conflicting/polarized views or options |
| Conflict/strategy | …as a game among elites; who's ahead or behind in winning debate; battle of personalities; or groups; (usually journalist-driven interpretation.) |

[1] This frame, while not part of the typology of science communication frames proposed by Nisbet (2009), was developed from a previous science communication study on the framing of stem-cell research (Nisbet et al., 2003), and included here as it was thought to be applicable due to the high degree of grass-roots activism associated with fracking.

*Table 2.2 – Complete list of Attributes*

| **Supporting Attributes** | **Examples** |
|---|---|
| *Economic* | |
| Increases oil/nat. gas supply | Increases the availability of petroleum products such as gas, diesel, heating oil, kerosene etc. in the US |
| Creates jobs | Creates jobs (nationally/regionally) |
| Benefits the economy | …by lessening US reliance on foreign oil, increased energy security, increased petrol exports, decreased petrol imports or the lowering of crude oil prices |
| Benefits society | ...through increases in tax revenue, increased job availability, relief from economic recession, etc. |
| Benefits the consumer | ...through lowered home energy costs, reduced prevalence of gas spikes, lower gasoline prices, etc. |
| Increases industrial productivity | Fracking increases productivity within the industrial sector due to less expensive electricity, oil or NG. |
| Provides remedy to “peak oil” | Fracking serves to delay the idea of “peak oil” or lessens the impact of moving beyond "peak oil" |
| Other | Supporting attributes not listed above |
| *Technological* | |
| Fracking is safe | Because the technology is similar to, or is based on, proven conventional oil/gas production technologies |
| Development of waterless fracking techniques | Development is making/will make HF increasingly safe and/or less resource intensive |
| Spurs technological innovation | Fracking spurs technological innovation by driving the need to develop new uses for natural gas |
| Fracking tech. could be used abroad | Fracking technology could be used to recover resources abroad |
| New fracking technology is safer | New technologies for drilling, well construction, and waste disposal have made fracking safe(r) |
| Other | Supporting attributes not listed above |

*Table 2 (Continued) – Complete list of Attributes*

| **Supporting Attributes** | **Examples** |
|---|---|
| *Ecological* | |
| Reduces overall greenhouse emissions | Reduces overall greenhouse gas emissions/ does not contribute to global warming/ reduces overall carbon emissions associated with conventional energy sources |
| Frack water is recycled | Frack water is recycled (decontaminated/purified) or reused (used again to frack new wells) |
| Seismic activity not a significant threat | Seismic activity from fracking is not a significant environmental threat |
| Environmental risks are minimal | Environmental risks are minimal – Fracking is not a significant threat to water/air/soil resources |
| Other | Supporting attributes not listed above |
| *Political & Regulatory* | |
| Politicians show support for fracking | Politicians show support for fracking (President, State/Local Politicians are in favor) |
| Current laws/regulations *are sufficient* or new laws have made *fracking safe(r)* | Current laws / regulations *are sufficient* or new laws have made *fracking safe(r)* |
| Other | Supporting attributes not listed above |
| *Local (community) Impacts - Positive* | |
| Job creation | Fracking creates jobs at the local-level |
| Local economic benefit/growth | Fracking creates economic growth through such things as higher wages, increases in local business revenues, etc.… |
| Local creation of wealth | Individuals benefit through land leases w/energy companies |
| Increase in local tax revenue | Increase in local tax revenue provides benefit to local governments, schools, infrastructure, etc.… |
| Impact on business startups | Fracking brings new businesses into the community |
| Disruption of rural communities is brief | Once wells are built, fracking industry process is far less visible |
| Other | Supporting attributes not listed above |

*Table 2 (Continued) – Complete list of Attributes*

| **Opposing Attributes** | **Examples** |
|---|---|
| *Ecological* | |
| Air Pollution | Fracking affects air quality negatively via fumes, |
| Soil pollution | Fracking poses a danger to agriculture and livestock, ecosystems, local environments etc. |
| Water pollution | Fracking poses a threat to ground and drinking water, |
| Radioactivity | Fracking waste could potentially contain radioactive |
| Earthquakes | Fracking may potentially cause earthquakes |
| Global Warming | Fracking is a potential contributor to global warming |
| HF "Pollutes the environment" | In general, fracking pollutes the environment |
| Human Health Hazard | Fracking poses a hazard to human health through such things as well explosions, industrial accidents, poisoning/sickness |
| Excessive water consumption | Poses a danger to fresh water reserves by depleting aquifers/ is a threat to fresh water supply |
| Land-Take | Fracking uses significantly more land compared to |
| Other | Opposing attributes not listed above |
| *Economic* | |
| Fracking is not cost effective | Due to the expense of fracking, no economic benefit is realized |
| Fracking boom is an economic bubble | Investment is far riskier than claimed |
| Fracking boom makes only a few energy companies rich | Fracking makes only a few large companies profits/fracking benefit is consolidated among wealthy petroleum conglomerates. |
| Estimates of oil/gas reserves overstated | Estimates of existing resources are overly optimistic, thereby making fracking, in the long-term, unsustainable. |
| Nat. Gas/Oil surplus makes fracking unprofitable | Due to a supply glut, fracking has negatively impacted the US energy economy. The production of NG is unprofitable. |
| Hinders the economic growth of green energy technology sector | Investors seek to develop NG based technologies, diverting essential investment capital needed to develop green energy technologies. |
| Other | Opposing attributes not listed above |
| *Political & Regulatory* | |
| Political resistance to fracking | President, state or local Politicians oppose the use of, or expansion of hydraulic fracturing. |
| Fracking industry lacks sufficient Federal, State and/or Local regulation | Not enough restrictions on: chemicals used in fracking, well-site construction, wastewater/waste-product disposal |
| Corruption/shortsightedness | Uncontrolled growth of/eased restriction on HF industry |
| Other | Opposing attributes not listed above |

*Table 2 (Continued) – Complete list of Attributes*

| **Opposing Attributes** | **Examples** |
|---|---|
| *Technological* | |
| Requires the use of dangerous chemicals/produces toxic waste products | Fracking fluids are often proprietary blends of potentially toxic chemicals |
| Lack of long-term research on the effects of fracking technology/industry | Many aspects of fracking have yet to be thoroughly researched, thus the long-term effects cant be anticipated |
| HF technology is imperfect or unsafe/New Technology has not made HF safe(r) – | Fracking technology is imperfect. Accidents are often the result of leaky wells, inadequate transport/disposal/recycling technology. |
| Reduces urgency to develop renewable/green energy technologies | Focus shifts away from development of green technologies & toward development of new/better NG technologies |
| Other | Opposing attributes not listed above |
| *Local (community) Impacts - Negative* | |
| Increased truck traffic | Unsafe roads / damage to infrastructure, traffic accidents |
| Housing shortage | Causes increased rental prices, impacts low-income families |
| Crime increases / Use of illegal drugs | Communities experience increased criminal activates, along with increased drug use. |
| High Tax rates | Negative impact on tax rates at the local-level |
| Loss of privacy | Due to the proximity of frack well, residents may |
| Environmental threat | In general, fracking poses a threat to the environment |
| Air Quality Issues | Fracking negatively affects air quality |
| Water Pollution/Danger to drinking water | Fracking negatively affects water quality, pollutes local water supply |
| Soil Pollution | Chemical/waste water spills, and by-product storage/disposal threaten agriculture and livestock, local |
| Noise Pollution | Equipment noise, such as trucks, generators and pumps causing disruptions within the community. |
| Light pollution from drilling equipment | Frack well lighting disrupting local quality of life. |
| Human hazard | Fracking is potentially hazardous to humans, due to danger of well explosions, industrial accidents, poisoning/sickness |
| Rural Industrialization | Local landscapes are being transformed through the rapid growth of fracking industry |
| Loss of Property Value | Proximity to frack wells, pumping stations, etc. negatively impact property value |
| Other | Opposing attributes not listed above |

# CHAPTER 3

# METHODS

## 3.1 Sample

Newspaper data for this study came from a keyword search of the *LexisNexis*, *Factiva* and *NewsBank* databases. Using the keywords "*fracking"* or "*hydraulic fracturing"* or "*shale gas"* or *"horizontal drilling"* or *"unconventional resources"* appearing in the headline, lead paragraphs, or index terms, articles were retrieved from three national newspapers and four regional newspapers. The national newspapers included in the sample are *The New York Times,* the *Washington Post* and *The Wall Street Journal*. The four regional newspapers included in the sample are the *Columbus Dispatch*, *New Orleans Times-Picayune, Fort Worth Star-Telegram* and *Pittsburgh Post-Gazette.*[2] All articles included in the sample were published between January 2000 and December 2014.[3] The starting point of January, 2000 was chosen so as to capture the development of the fracking industry following the commercial development of the

[2] The original design of this study involved looking at both newspaper and broadcast news sources. Originally, the sample included transcripts from seven television news networks: ABC, CBS, NBC, Fox, CNN, CNBC, and MSNBC. A keyword search of the Lexis-Nexis broadcast transcript database using the keywords: *fracking* OR *hydraulic fracturing* OR *shale gas* OR *horizontal drilling OR unconventional resources*, appearing in the HLEAD segment, between 1/1/2000 through 12/31/2014, yielded a total of 76 transcripts between all seven television networks. As the lack of a robust sample of broadcast transcripts would likely limit the generalizability of the analysis beyond the issue of hydraulic fracturing, the choice was made to exclude broadcast news sources.

[3] The study was conceived nearing the end of 2014, thus the date range for data collection was 2000-2014. Coder training began in early 2015, and after several months of training the coding assistant relocated to another city. Therefore, it was necessary to recruit another coder, and begin training all over again; a process with took, for a variety of reasons, the better half of 2016. For these reasons, the date range of the analysis does not include more recent years, such as 2015 or 2016.

Barnett shale play in Texas around 1999, an event generally considered to be the point at which both hydraulic fracturing and horizontal drilling were being employed on a commercial scale (El, 2000).

The decisions to analyze only traditional newspapers serves to limit the external validity of the findings of this study, although evidence suggests that news content found within both traditional and newer forms of media are not separate but highly correlated (Sayre, Bode, Shah, Wilcox, & Shah, 2010). Nevertheless, newspapers were selected as the primary data source for the analysis for several reasons. First, newspapers provide a highly efficient means to study a mass medium, as they tend to be archived in searchable databases, thereby providing a readily available source of media content for analysis. While newspaper readership has dropped off dramatically in recent years, newspapers remain an essential medium for the study of controversial issues; this is especially true of complex issues, such as those related to health and science communication (Len-Ríos et al., 2009; McKeever, 2013; Riffe, Lacy, & Reimold, 2007; Vasterman, Yzermans, & Dirkzwager, 2005). While the role of the Internet has grown significantly as a means of news dissemination, archived news content tends to be more difficult to study, as it often consists of abridged versions of printed news articles or content that may simply become unavailable over time (McMillan, 2000).

So as to provide both a national, as well as a regional perspective, news coverage from both national and regional newspapers were included in the sample. *The New York Times, Washington Post* and *The Wall Street Journal,* as they are each news sources that function to set the agenda of other newspapers, were sampled in order to gain a general perspective on national news coverage. Newspaper partisanship was also a consideration among national news sources. *The New York Times*, and *Washington Post* were chosen as

they are thought to be somewhat liberal leaning news sources, and the *Wall Street Journal* was chosen as it is thought to be a conservative leaning news source.

In order to make a comparison across newspapers from four states, one major local newspaper was chosen from *Texas*, *New Orleans*, *Ohio* and *Pennsylvania*. Regional newspaper selection was based on both circulation as well as partisanship, such that the *Columbus Dispatch,* and *New Orleans Times-Picayune* were chosen to represent conservative leaning regional news sources from both the Northeastern and the Southern Central regions of the US. *The Fort-Worth Star Telegram,* and *Pittsburg-Post Gazette,* were chosen to represent liberal leaning regional news sources in both the Northeastern and the Southern Central regions. Partisanship leaning of the selected news sources were first determined based upon each newspapers presidential endorsements over the past 6 presidential elections, and then referenced against the online resource NewsPrism.com (Seay, 2014).

The resulting search yielded a total of 5,106 articles matching at least one of the keywords "*fracking"* or "*hydraulic fracturing"* or "*shale gas"* or *"horizontal drilling"* or *"unconventional resources."* Using systematic stratified sampling,[4] an initial round of sampling produced a total of 606 newspaper articles for content analysis; sample size per newspaper ranged from 80 to 96 articles (see Table 3.1 for a detailed description of the sample). The overall goal for content sampling was to produce a representative random sample of approximately 450 related articles, consisting of approximately 65 related articles per source. A sample size of 450 articles was thought to be sufficiently large so as to be generalizable to the entire population of hydraulic fracturing news articles.

[4] Sampling interval (k) was calculated by dividing the total number of news items by sample size. Every kth item then was selected into the sample.

Approximately 20% of articles sampled were either unrelated or simply mentioned fracking without being the main focus of the article. When a particular news source produced fewer related articles than the goal of 65, a second round of systematic sampling was utilized, in order to obtain a sufficient quantity of articles to adequately represent the news source. The final sample consisted of 534 related articles, averaging 76 related articles per news source.

### 3.2 Coding

A coding instrument was developed through an extensive examination of news articles, scholarly journals, books and relevant websites, in order to develop an initial understanding of the issue of hydraulic fracturing and the various issue attributes associated with the topic. The coding sheet was revised several times to its final version during preliminary coder training. A code book was also developed to serve as a reference source to coders, which included coding instructions, definitions of relevant terminology, as well as specific coding rules regarding the certain terms and issues. The code book was also revised several times during coder training, so as to keep an updated list of agreed upon coding rules and procedures. The basic process followed by coders is as follows.

Coders first read the entire article, and determined the organizing theme of each article by looking for the major focus of the article, examining aspects of the text, such as headlines, subheads, quotations, statistics and charts, and concluding statements and paragraphs (Tankard, 2001). Each article was categorized based upon the framing typology suggested by Nisbet (2010). Coders then selected one frame that best represented the primary organizing theme of the article. In the case that coders could not identify a primary theme, coders were instructed to mark the article as *other*, so that the

article could be set aside for discussion, so that it could be determined to be unrelated, or the basis for a revision to the code book. Ultimately, each article was coded as having only one of nine organizing frames: *technological uncertainty*, *economic impact, public accountability/governance, public opinion/engagement, social progress, middle way/alternative path, conflict/strategy, morality/ethics* or *Pandora's Box/Runaway Science* (see Table 2.1. for a detailed description each frame).

Articles were then coded based upon *issue attributes* mentioned in the news coverage. Coders were asked to code for each issue attribute found within each article. The range of issue attributes included economic, technological, ecological, political and regulatory, as well as local community level attributes (see Table 2.2 for a complete list of issue attributes). The coding instrument included issue attributes, representing both reasons to support and reasons to oppose hydraulic fracturing, which were identified through an examination of the academic literature, as well as through an initial reading of news coverage about hydraulic fracturing. The coding instrument also included an "other" variable, provided specifically for instances in which the coder encountered issue attributes that were not present on the code sheet. When a specific attribute appeared more than once in a particular article, coders counted that attribute as being one mention. In other words, attributes were only coded once regardless of the number of times they appeared in a particular article, so as to not artificially inflate the number of specific mentions of any one attribute within a particular article.

Finally, after reading each article coders were asked to consider the overall tone of the article. The coders then evaluated each paragraph of the article, considering whether each paragraph was positive, negative or neutral toward the use of hydraulic fracturing. Coders were asked to make an evaluation based upon the overall balance of

the argument presented in the story, the balance of consequences described, and the type of description included (Einsiedel, 1992; Kim et al., 2014, Niven, 2003). Articles which consisted of mostly positive or negative paragraphs - that is to say at least two-thirds of the total paragraphs were evaluated to be positive or negative - were coded accordingly. Otherwise, articles were to be coded as neutral/balanced.

Two coders coded the articles after having conducted a series of training and pilot-test sessions. Intercoder reliability was calculated by double-coding a random subsample ($n$ = 91 or 17%) of the data. Intercoder reliability, calculated using Kripendorff's Alpha averaged .74 for the organizing theme, and ranged between .67 and .85 with an average of .75 for issue attributes. Intercoder reliability for story tone, calculated as an ordinal variable was .81 (See Table 3.2 for a complete breakdown of inter-coder reliability data).

*Table 3.1 – Detailed Description of Sample*

| | *Total* | | *New York Times* | | *The Washington Post* | | *Wall Street Journal* | | *Pittsburg Post Gazette* | | *Columbus Dispatch* | | *New Orleans Times-Picayune* | | *Fort-Worth Star Telegram* | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***Year*** | ***%*** | ***N*** | ***%*** | ***n*** | ***%*** | ***n*** | ***%*** | ***n*** | ***%*** | ***n*** | ***%*** | ***n*** | ***%*** | ***n*** | ***%*** | ***n*** |
| 2000 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2001 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2002 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2003 | 0.2 | 1 | 0 | 0 | 1.4 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2004 | 0.4 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2.6 | 2 |
| 2005 | 0.7 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5.2 | 4 |
| 2006 | 0.9 | 5 | 0 | 0 | 0 | 0 | 1.3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 5.2 | 4 |
| 2007 | 1.1 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7.8 | 6 |
| 2008 | 3.7 | 20 | 4 | 3 | 1.4 | 0 | 5.3 | 4 | 1,3 | 1 | 1.1 | 1 | 2.8 | 2 | 10.4 | 8 |
| 2009 | 2.6 | 14 | 1.3 | 1 | 4.2 | 3 | 2.6 | 2 | 2.7 | 2 | 0 | 0 | 1.4 | 1 | 6.5 | 5 |
| 2010 | 7.9 | 42 | 4 | 3 | 2.8 | 2 | 6.6 | 5 | 16 | 12 | 1.1 | 1 | 1.4 | 1 | 23.4 | 18 |
| 2011 | 18.4 | 98 | 30.7 | 23 | 5.6 | 4 | 17.1 | 13 | 34.7 | 26 | 10.3 | 9 | 8.3 | 6 | 22.1 | 17 |
| 2012 | 19.3 | 103 | 29.3 | 22 | 25 | 18 | 21.1 | 16 | 12 | 9 | 34.5 | 30 | 1.4 | 1 | 9.1 | 7 |
| 2013 | 15.9 | 85 | 22.7 | 17 | 22.2 | 16 | 29.7 | 15 | 16 | 12 | 21.8 | 19 | 5.6 | 4 | 2.6 | 2 |
| 2014 | 28.8 | 154 | 8 | 6 | 37.5 | 27 | 26.3 | 20 | 17.3 | 13 | 31 | 27 | 79.2 | 57 | 5.2 | 4 |

*Table 3.2 - Inter-coder Reliability Data*

| **Supporting Attributes** | **Krippendorff's α** |
|---|---|
| *Economic* | |
| Increases oil/nat. gas supply | 0.85 |
| Creates jobs | 0.75 |
| Benefits the economy | 0.84 |
| Benefits society | 0.84 |
| Benefits the consumer | 0.66 |
| Increases industrial productivity | 1.00 |
| Provides remedy to "peak oil" | 1.00 |
| Other | undefined* |
| *Technological* | |
| Fracking is safe | 0.89 |
| Development of waterless fracking techniques | undefined* |
| Spurs technological innovation | 0.85 |
| Fracking tech. could be used abroad | 0.66 |
| New fracking technology is safer | 0.78 |
| Other | undefined* |
| *Ecological* | |
| Reduces overall greenhouse emissions | 0.79 |
| Frack water is recycled | 0.66 |
| Seismic activity not a significant threat | undefined* |
| Environmental risks are minimal | 0.84 |
| Other | undefined* |
| *Political & Regulatory* | |
| Politicians show support for fracking | 0.76 |
| Current laws/regulations *are sufficient* or new laws have made *fracking safe(r)* | 0.82 |
| Other | undefined* |
| *Local (community) Impacts - Positive* | |
| Job creation | 0.75 |
| Local economic benefit/growth | 0.74 |
| Local creation of wealth | 0.66 |
| Increase in local tax revenue | 0.66 |
| Impact on business startups | 0.79 |
| Disruption of rural communities is brief | undefined* |
| Other | undefined* |

*Table 3.2 (Continued) - Inter-coder Reliability Data*

| **Attributes - Reasons to Oppose** | **Krippendorff's α** |
|---|---|
| *Ecological* | |
| Air Pollution | 0.75 |
| Soil pollution | undefined* |
| Water pollution | 0.70 |
| Radioactivity | 0.79 |
| Earthquakes | undefined* |
| Global Warming | 0.63 |
| HF "Pollutes the environment" | 0.67 |
| Human Health Hazard | 0.69 |
| Excessive water consumption | 0.74 |
| Land-Take | undefined* |
| Other | undefined* |
| *Economic* | |
| Fracking is not cost effective | 0.65 |
| Fracking boom is an economic bubble | undefined* |
| Fracking boom makes only a few energy companies rich | 0.55 |
| Estimates of oil/gas reserves overstated | 0.66 |
| Nat. Gas/Oil surplus makes fracking unprofitable | 0.82 |
| Hinders the economic growth of green energy technology sector | 0.66 |
| Other | undefined* |
| *Political & Regulatory* | |
| Political resistance to fracking | 0.77 |
| Fracking industry lacks sufficient Federal, State and/or Local regulation | 0.82 |
| Corruption/shortsightedness | 0.79 |
| Other | undefined* |
| *Technological* | |
| Requires the use of dangerous chemicals/produces toxic waste products | 0.75 |
| Lack of long-term research on the effects of fracking technology/industry | 0.55 |
| HF technology is imperfect or unsafe/New Technology has not made HF safe(r) – | 0.77 |
| Reduces urgency to develop renewable/green energy technologies | 0.74 |
| Other | undefined* |

*Table 3.2 (Continued) - Inter-coder Reliability Data*

| **Attributes - Reasons to Oppose** | **Krippendorff's α** |
|---|---|
| *Local (community) Impacts - Negative* | |
| Increased truck traffic | 0.73 |
| Housing shortage | undefined* |
| Crime increases / Use of illegal drugs | 0.66 |
| High Tax rates | undefined* |
| Loss of privacy | undefined* |
| Environmental threat | 0.81 |
| Air Quality Issues | 0.75 |
| Water Pollution/Danger to drinking water | 0.73 |
| Soil Pollution | 0.67 |
| Noise Pollution | 0.72 |
| Light pollution from drilling equipment | undefined* |
| Human hazard | 0.82 |
| Rural Industrialization | 0.69 |
| Loss of Property Value | 1.00 |
| Other | undefined* |
| **Frames (Organizing Themes)** | |
| Scientific/Technical Uncertainty | 0.72 |
| Economic Impact | 0.62 |
| Public Accountability/Governance | 0.80 |
| Public Opinion/ Engagement/ Education | 0.55 |
| Social Progress: (Non-Economic) | 0.85 |
| Morality/Ethics | undefined* |
| Pandora's Box/Frankenstein's Monster/ Runaway | 0.66 |
| Middle Way/Alternative Path | undefined* |
| Conflict/Strategy | 1.00 |
| **Tone** | |
| Negative | 0.78 |
| Neutral | 0.60 |
| Positive | 0.76 |

# CHAPTER 4

# FINDINGS

The sample sought to include articles from the beginning of 2000, but no articles matching the search criteria were found until 2003. Thus, Figure 4.1 presents the total number of news articles over an eleven-year period, between 2003 and 2014 matching the keywords in the headline or lead paragraph of the newspapers. The figure clearly demonstrates a small and gradual increase in news coverage of fracking between the years of 2000 through 2009, followed by a steep increase in coverage between 2009 through 2012. The figure also shows a significant increase in the number of news reports between the years of 2013 and 2014. A complete description of the sample by both year and news source is represented in Table 3.1.

## 4.1 Frames

RQ1 examines the ways in which fracking stories are typically framed within newspaper coverage. Table 4.1 shows the distribution of frames used in stories about fracking, indicating that the majority of news stories (89.6 percent or n = 478) employed one of four dominant themes: *technological uncertainty*, *economic impact*, *public accountability/governance*, or *conflict strategy*. News stories were most likely to employ the public *accountability/governance* frame when reporting on fracking. This frame appeared in about 3 out of 10 articles (29.8 percent or n = 159). The *technological uncertainty* frame was used in 25.1 percent of news stories (n = 134). The third most

likely theme, *economic impact*, appeared in 23.8 percent of news stories (n = 127). The *conflict/strategy* frame appeared in 10.9 percent of news stories (n = 58). The remaining five themes, *public opinion/engagement, social progress, middle way/alternative path, morality/ethics, and Pandora's Box/runaway science, accounted* for the remaining 10.4 percent of news stories.

RQ2 examined the extent to which particular themes appeared in national news coverage compared to state-level newspaper coverage. Table 4.1 shows which frames were most used most often in stories about fracking in both national newspaper coverage, as well as in state–level news coverage from each of the two selected regions combined.

Again, *technological uncertainty*, *economic impact*, *public accountability/governance*, or *conflict strategy* were the four most dominant themes found in news coverage. National news coverage employed these four themes in 89.6 percent (n = 478) of news coverage, as compared to state-level news coverage totaling 90.6 percent (n = 281). Similarly, newspaper coverage in the Texas and Louisiana region totaled 89.9 percent (n = 134), while newspaper coverage in the Pennsylvania and Ohio region totaled 90.7 percent (n = 147).

In order to fully address RQ2, a comparison was also made comparing the prominence of particular frames used within national news coverage compared to news coverage from all four of the state-level newspapers combined. Using a Chi-square analysis on a frame by frame basis revealed no significant differences between the groups. Therefore, national newspapers are no more likely than state newspapers to utilize a particular frame when talking about fracking.

RQ3 examined the extent to which particular themes appeared in newspapers from Texas and Louisiana as compared to newspapers form Pennsylvania and Ohio. Table 4.1 shows which frames were used most prominently between the two regions of comparison.

The *technical understanding* frame appeared 31.5 percent (n = 51) of stories from newspapers from Pennsylvania and Ohio compared to 15.4 percent (n = 23) in stories from Texas and Louisiana. Chi-square test showed the comparison between the two groups to be statistically significant ($\chi 2 = 11.020$, $p = .001$). Thus, newspapers from Pennsylvania and Ohio were significantly more likely to use the *technological uncertainty* frame when reporting on fracking.

In the Texas and Louisiana region, the *economic impact* frame was found in 32.9 percent or (n = 49) cases, versus Pennsylvania and Ohio with 17.9 percent (n = 29). Chi-square test showed the difference between the two groups to be statistically significant ($\chi 2 = 9.275$, $p = .002$). Thus, newspapers in Texas and Louisiana were significantly more likely to use the *economic impact* frame compared to newspapers in Pennsylvania and Ohio.

The *public accountability/governance* frame appeared in Pennsylvania and Ohio newspapers 37 percent (n =60) compared to Texas and Louisiana papers with 26.2 percent (n = 39). Chi-square test suggests the difference between the two groups to be statistically significant ($\chi 2 = 4.220$, $p = .04$). Hence, newspapers from Pennsylvania and Ohio were significantly more likely to use the *public accountability/governance* frame as compared to newspapers from Texas and Louisiana when talking about fracking.

The *conflict/strategy* frame was coded in Texas and Louisiana newspapers totaling 15.4 percent (n = 32) as compared to Pennsylvania and Ohio newspapers having 4.3 percent (n = 7). Chi-square analysis revealed a significant difference between the two groups ($\chi 2 = 11.002$, $p = .001$). Therefore, newspapers in Texas and Louisiana were significantly more likely to use the *conflict/strategy* frame when reporting on fracking issues compared to newspapers from Pennsylvania and Ohio.

Of the frames that were mentioned less frequently with the sample, the *public opinion/engagement* frame comprised just 4.5 percent of the sample (n = 14). Texas and Louisiana news stories used the *public opinion/engagement* frame a total of 7.9 percent (n = 11) compared to Pennsylvania and Ohio newspapers with 1. 9 percent (n = 3). A Chi-square analysis demonstrated a significant difference between the two groups ($\chi 2 = 5.523$, $p = .019$). This suggests that Texas and Louisiana newspapers were significantly more likely to use the *public opinion/engagement* frame compared to Pennsylvania and Ohio newspapers. Similarly, the *morality/ethics* frame represented just 1.3 percent of the sample (n = 4), with Pennsylvania and Ohio papers totaling 2.5 percent (n = 4) compared to Texas and Louisiana papers totaling 0 instances coded. Chi-square analysis did not find the difference between the groups to be statistically significant ($\chi 2 = 3.727$, $p = .054$), although the results approached statistical significance. Considering the marginal significance of the findings, it could be argued that newspapers in Pennsylvania and Ohio were somewhat more likely to frame stories using the *morality/ethics* frame compared to newspapers in Texas and Louisiana.

RQ4 examines differences in the use of specific frames between conservative and liberal newspapers when reporting on fracking. Table 4.1 displays the prevalence of

specific frames, found within news reports on fracking between liberal and conservative leaning newspapers. As with the results of the other comparisons made regarding the selection of specific frames used within news coverage of fracking, when comparing conservative and liberal news sources, 89.6 percent (n = 478) of news stories were coded as using one of four frames: *technological uncertainty, economic impact, public accountability/governance,* and *conflict strategy.* Of these four most prominent frames, both conservative and liberal newspapers were most likely to use the *public accountability/governance* frame with 31.5 percent (n = 74) and 28.4 percent (n = 85) respectively. *Technological uncertainty* was the second most prominent frame within conservative newspapers with 26.0 percent (n = 61), whereas *economic impact* was the second most likely frame to appear in liberal newspapers with 24.4 percent (n = 77). The third most prominent frame found within conservative newspapers was the *economic impact* frame, totaling 21.3 percent (n = 50), whereas the third most prominent frame found within liberal news sources was *technological uncertainty,* occurring 24.4 percent (n = 73). The fourth most prominent frame found within both liberal and conservative news sources was *conflict strategy* with 10.7 percent (n =32) and 11.1 percent (n = 26) respectively.

In addressing RQ4, Chi-square tests were performed between each of the possible frames based upon partisanship. The *public opinion* frame was coded a total of 4.5 percent (n = 24). Conservative news sources used the *public opinion* frame 6.8 percent (n = 16), as compared to liberal news sources with 2.7 percent (n = 8). Chi-square test showed the difference between the two groups to be statistically significant ($X^2 = 5.236$, $p = .022$), suggesting that conservative newspapers are significantly more likely than

liberal newspapers to use the *public opinion* frame when reporting on fracking. Chi-square analysis showed no other significant differences between the use of other themes when reporting on fracking based upon partisanship.

**4.2 Issue Attributes**

RQ5 examined which issue attributes appeared more often in newspaper coverage compared to others. In order to make a comparison, the coding of individual attributes, were summed and placed into categories, representing both reasons to support and reasons to oppose fracking. Thus, Table 4.2 displays both reasons to support and reasons to oppose fracking organized by *economic*, *technological*, *ecological*, *political & regulatory*, as well as *local (community level)* attributes (for a complete list of individual attributes see Table 2.2).

Considering the attributes measuring reasons to support fracking, *economic* reasons were given most frequently (39.9 percent or n = 213) within new stories. *Technological* reasons to support were the second most frequently mentioned reason with 25.7 percent (n = 137), followed by *political and regulatory* reasons (21.2 percent or n = 113), then *ecological* reasons (17.6 percent or n = 94), and finally *local community level* reasons (16.9 percent or n = 90). Considering reasons to oppose fracking, *political and regulatory* reasons were mentioned most often in news coverage with 41.9 percent (n = 224). *Ecological* reasons were the second most often mentioned reason to oppose fracking (34.5 percent or n = 184), followed by *local community level* reasons (27.2 percent or n = 145), and then *technological* reasons (25.7 percent or n = 137). The least mentioned reason to oppose fracking found in news stories was *economic* with 13.1 percent (n = 70).

RQ6 seeks makes a comparison, examining the prominence of reasons to both support and oppose fracking, between national and state-level news coverage. Table 4.2 shows the differences in reasons to support and oppose fracking between national newspaper coverage versus state-level coverage.

An analysis of national and state-level news reporting, comparing the prominence of reasons to both support and oppose fracking coded within news coverage was made. In national news coverage, *economic* reasons to support were coded 54.7 percent (n = 122) times, compared to 29.3 percent (n= 91) within state-level coverage. Chi-square test showed a significant difference between the two groups of comparison ($\chi 2$ (1, N = 534) = 35.078, $p$ = .000). This suggests that national newspaper coverage is significantly more likely to mention economic reasons to support fracking compared to state-level news coverage. *Ecological* reasons to support fracking appeared 26.6 percent (n = 59) in national news reports on fracking compared to 25.1 percent (n = 78) within state-level news coverage. Chi-square test showed a significant difference between the groups being compared ($\chi 2$ (1, N = 534) = 4060, $p$ = .044). Thus, indication that national newspaper coverage is significantly more likely to mention ecological reasons to support fracking compared to state- level news. *Political and regulatory* reasons to support fracking were mentioned in 25.6 percent (n = 57) of national newspapers versus 18 percent (n = 56) of state-level newspapers. Chi-square test found the difference in mentions to be statistically significant ($\chi 2$ (1, N = 534) = 4.442, $p$ = .035), which suggests that national newspapers are significantly more likely to mention political and regulatory reasons to support fracking compared to state-level papers.

Considering reasons to oppose fracking, *ecological* reasons were coded within 46.2 percent (n = 103) of national newspapers, as compared to 26 percent (n = 81) of state-level papers. Chi-square test found the difference in mentions to be statistically significant ($\chi 2$ (1, N = 534) = 23.334, $p$ = .000). Thus, national newspapers were significantly more likely to mention ecological reasons to oppose fracking compared to state-level papers. *Economic* reasons to oppose fracking were found within 20.2 percent (n = 45) of national newspaper coverage, as compared to 8 percent (n = 25) of state-level news. Using a Chi-square test, a statistically significant difference was found between the groups of comparison ($\chi 2$ (1, N = 534) = 16.775, $p$ = .000), thereby indicating national news coverage was significantly more likely to mention economic reasons to oppose fracking compared to state-level reportage. Reasons to oppose fracking regarding issues of *technological uncertainty* were found present in 32.3 percent (n = 72) of national newspapers, whereas state-level papers mentioned technical uncertainty in 20.6 percent (n = 64) of news stories. Using a Chi-square test, a statistically significant difference was indicated ($\chi 2$ (1, N = 534) = 9.379, $p$ = .002). This suggests that national newspapers were significantly more likely to mention technological uncertainty when reporting on fracking compared to state newspapers. *Local community level* reasons to oppose fracking were found within 34.7 percent (108) of state-level reportage, compared to 16.6 percent (n = 37) within national news coverage. A Chi-square analysis of the mentions between groups revealed statistical significance within the comparison ($\chi 2$ (1, N = 534) = 21.593, $p$ = .000). Thus, state-level news coverage is significantly more likely to mention local (community level) reason to oppose fracking compared to national coverage on the issue.

RQ7 asked whether certain attributes were more likely to appear in news stories from Texas and Louisiana versus news stories from Pennsylvania or Ohio. Table 4.2 displays the prominence of both reasons to support and reasons to oppose fracking as compared between each of the two selected regions.

In order to address RQ7 comparisons were made between each of the *reasons to support* fracking found in coverage from both the regions of Pennsylvania and Ohio, as well as from Texas and Louisiana. *Economic* reasons to support fracking were coded in 34.6 percent (n = 56) of stories from Pennsylvania and Ohio versus 23.5 percent (n = 35) of newspapers from Texas and Louisiana. Chi-square test indicated a significant difference between the two groups ($\chi 2$ (1, N = 311) = 4.602, $p$ = .032). Thus, newspapers in Pennsylvania and Ohio were significantly more likely to mention economic reasons to support fracking compared to papers in Texas and Louisiana. *Technological* reasons to support fracking were present 31.5 percent (n = 47) in Texas and Louisiana vs 19.1 percent (n = 31) in Pennsylvania and Ohio. Chi-square test showed the difference in mentions between news sources to be statistically significant ($\chi 2$ (1, N = 311) = 6.359, $p$ = .012). Therefore, newspapers from Texas and Louisiana were significantly more likely to mention technological reasons to support fracking compared to newspapers in Pennsylvania and Ohio. *Political and Regulatory* reasons to support fracking were mentioned 24.7 percent (n = 40) by papers in Pennsylvania and Ohio compared to 10.7 percent (n = 16) in papers from Texas and Louisiana. Chi-square analysis showed the difference between groups to be statistically significant ($\chi 2$ (1, N = 311) = 10.235, $p$ = .001). Hence Pennsylvania and Ohio newspapers were significantly more likely to

mention political and regulatory reasons to support fracking compared to Texas and Louisiana newspapers.

Considering reasons to oppose fracking within state-level news coverage, *ecological* reasons were mentioned 35.8 percent (n = 58) by Pennsylvania and Ohio newspapers, compared to 15.4 percent (23) by Texas and Louisiana newspapers. Chi-square test showed a significant difference between the groups ($\chi 2$ (1, N = 311) = 16.714, $p$ = .000). This indicates that Pennsylvania and Ohio newspapers are significantly more likely to mention ecological reasons to oppose fracking compared to Texas and Louisiana news sources. *Technological* reasons to oppose fracking were coded in 25.3 percent (n = 41) of Pennsylvania and Ohio newspapers, compared to 15.4 percent (n = 23) in Texas and Louisiana newspapers. Chi-Square test showed a statistically significant difference between the two groups ($\chi 2$ (1, N = 311) = 4.628, $p$ = .031). Thus, newspapers from Pennsylvania and Ohio were significantly more likely to mention technological reasons to oppose fracking compared to Texas and Louisiana newspapers. *Local community level* reasons to oppose fracking were mentioned in 42.3 percent (n =63) of newspapers from Texas and Louisiana versus 27. 8 percent (n = 45) of newspapers from Pennsylvania and Ohio. Chi-square analysis revealed a statistically significant difference between the number of mentions within the groups ($\chi 2$ (1, N = 311) = 7.203, $p$ = .007). Thus, newspapers in Texas and Louisiana were significantly more likely to mention local (community level) reasons to oppose fracking compared to newspapers in Pennsylvania and Ohio.

H1a predicted that newspapers in Texas and Louisiana would be less likely to than papers in Pennsylvania and Ohio to mention *environmental damage* as an attribute.

Having combined the 10 reasons (attributes) to oppose fracking due to *environmental damage,* the data shows that *environmental damage* was mentioned in 15.4 percent (n = 23) of news stories for Texas and Louisiana, whereas it was mentioned in 35.8 percent (n = 58) of news stories from Pennsylvania and Ohio. A Chi-square analysis showed that newspapers from Texas and Louisiana were significantly less likely to mention environmental damage as compared to newspapers from Pennsylvania and Ohio ($\chi 2$ = 16.714, $p$ = .000). Thus, H1a was supported by the data.

H1b predicted that newspapers in Texas and Louisiana would be less likely than papers in Pennsylvania and Ohio to mention the reasons (*attributes*) to oppose hydraulic fracturing. The data shows that newspapers in Texas and Louisiana mentioned reasons to oppose fracking in 63.1 percent (n = 94) of news stories, whereas newspapers in Pennsylvania and Ohio mentioned reasons to oppose in 79 percent (n = 128) of news stories. A Chi-square test of independence was calculated comparing the frequency of mentions of reasons (attributes) to oppose fracking. The relation between the two variables was significant, ($\chi 2$ (1, N = 311) = 9.636, $p$ = .02). Newspapers in Texas and Louisiana were significantly less likely than newspapers in Pennsylvania and Ohio to mention reasons (attributes) to oppose fracking, thus, H1b was supported by the data.

RQ8 seeks to identify differences, regarding the use of particular issue attributes, between conservative and liberal leaning newspapers when reporting on fracking. As with the previous comparison of issue attributes, coding of individual attributes, were summed and placed into categories, representing both reasons to support and reasons to oppose fracking, as being either *economic, technological, ecological, political & regulatory, or local (community level)* attributes. Considering both conservative and

liberal newspapers, the reason to support occurring most frequently was *economic* with 43 percent (n = 101) and 37.5 percent (n = 112) respectively. Technology was the second most prominent reason to support found within conservative newspapers with 32.8 percent (n =77), followed by political and regulatory reasons with 21.7 percent (n = 51). Conversely, political and regulatory reasons to support were the second most common attribute with 20.7 percent (n =62), followed by technological reasons to support with 20.1 percent (n = 60).

A comparison was made between the prevalence of both reasons to support and reasons to oppose fracking, found within both liberal and conservative leaning newspapers. Considering reasons to support fracking, Chi-square analysis of technological reasons to support revealed a significant difference between conservative and liberal news sources ($\chi 2$ (1, N = 534) = 11.125, $p$ = .001), suggesting conservative newspapers were significantly more likely to mention *technological reasons* to support fracking compared to liberal news sources. Considering reasons to oppose fracking, Chi-square analysis of the *political/regulatory* attribute showed a significant difference between conservative and liberal news sources ($\chi 2$ (1, N = 534) = 5.623, $p$ = .018), thereby indicating that conservative newspapers were significantly more likely to mention *political/regulatory* reason to oppose fracking compared to liberal newspapers. A comparison of the prevalence of each of the remaining attributes within news reports by both liberal and conservative leaning newspapers revealed no other significant differences

H2a predicts that liberal newspapers are more likely than conservative newspapers to mention environmental damage as an attribute. Conservative newspapers

were more likely to mention environmental damage with 36.2 percent (n = 85) compared to liberal newspapers with 33.1 percent (n = 99). A Chi-square test showed no statistical significance between the groups ($\chi 2 = .545$, $p = .460$), thus H2a is not supported.

H2b predicts conservative newspapers are more likely than liberal newspapers to mention reasons (attributes) to support hydraulic fracturing. By summing all of the individual reasons to support (attributes) that were coded within the sample, a comparison could be made. Conservative newspapers mentioned reasons to support fracking in 74.5 percent (n = 175) of news stories versus 67.2 percent (n = 201) of liberal news stories. A Chi-square test suggests that the difference between the groups is approaching statistical significance ($\chi 2$ (1, N = 534) = 3.314, $p = .069$), or may be considered perhaps marginally significant. Thus, H2b, it could be argued, is weakly supported. Hence, conservative newspapers are only somewhat more likely than liberal newspapers to mention reasons to support fracking.

**4.3 Tone**

RQ9 examined whether the tone of news stories about fracking have been largely positive or negative. Of the sample of 534 articles analyzed, 39.1 percent (n = 209) were coded as positive, 31.5 percent (n = 168) were neutral and 29.4 percent (n = 157) were negative. Assuming an equal distribution between each aspect of the tone variable, A Chi-square goodness of fit analysis, indicated that the observed results differ significantly from the expected distribution ($\chi^2$ (2, $N = 534$) = 8.438, p = .015). Thus, the tone of stories about fracking was slightly - but statistically significantly - more likely to be positive, rather than negative or neutral.

RQ10 examines differences in the tone of hydraulic fracturing stories between national newspaper and regional newspaper coverage. Of the 223 articles analyzed from national news sources, 42.4 percent (n = 94) were coded as positive, 33.2 percent (n = 74) were coded as neutral, and 24.7 percent (n = 55) were negative. Of the 311 regional news articles analyzed, 37 percent (n=115) were coded as positive, 30.2 percent (n=94) were coded as neutral, and 37 percent (n=115) were coded as negative. A Chi-square test showed no significant difference between the tone of national and regional news sources ($X^2 = 4.173$, $p = .124$).

RQ11 seeks to understand the ways in which the tone of news stories about fracking differ between regional news coverage between each of the two selected regions. Of the 149 news articles analyzed from the states of Texas and Louisiana, 40.9 percent (n =61) were coded as positive, 24.2 percent (n =36) were coded as neutral, and 34.9 percent (n =52) were coded as negative. The total of 162 news articles analyzed from Pennsylvania and Ohio, showed 33.3 percent (n =54) as being positive, 35.8 percent (n =58) as neutral, and 30.9 percent (n =50) as being negative. A Chi-square test showed no significant differences between the groupings ($X^2 = 5.080$, $p = .079$).

RQ12 seeks to compare the tone of fracking stories by conservative leaning news sources with those of liberal leaning news sources. The tone of articles about fracking within both conservative and liberal news sources is presented in Table 4.3. Liberal newspapers more often presented the issue of fracking favorably compared to conservative newspapers with 41.8 percent (n = 125) versus 35.7 percent (n = 84) respectively. Conservative newspapers were more likely than liberal newspapers to present the issue of fracking in either neutral or unfavorable terms with 33.6 percent (n

=79) versus 29.8 percent (n =89) for neutral and 30.6 percent (n =72) versus 28.4 percent (n =85) for unfavorable. A Chi-square test showed no significant difference between the tone of conservative and liberal news stories ($X^2 = 2.074$, $p = .354$),

H3 predicts that the tone of hydraulic fracturing stories in conservative papers will be more positive than stories in liberal newspapers. The data indicates that liberal newspapers presented stories on fracking more favorably than conservative newspapers with 41.8 percent (n = 125) versus 35.7 percent (n = 84). A Chi-square test showed no significant difference between the groups for comparison ($\chi 2 = 2.074$, $p = .354$), thus H3 was not supported.

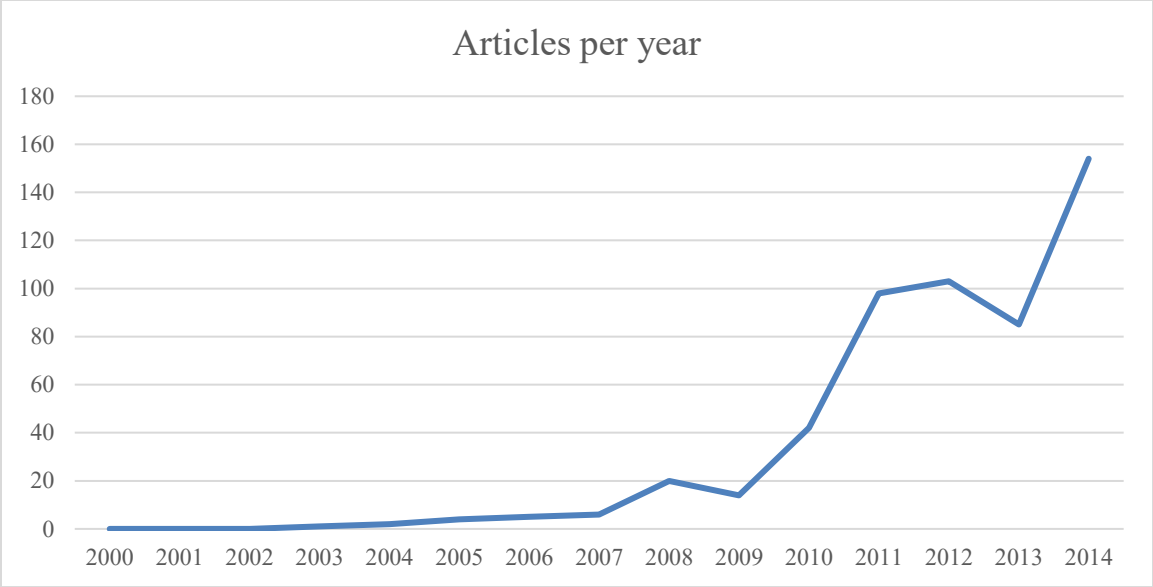


*Figure 4.1 – Distribution of Articles by Year*

*Table 4.1 – Distribution of Frames*

| | *National (n=223)* | | *Regional (n=311)* | | *TX & LA (n=149)* | | *PA & OH (n=162)* | | *Conservative (n=235)* | | *Liberal (n=299)* | | *Total (N=534)* | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **%** | **n** | **%** | **n** | **%** | **n** | **%** | **n** | **%** | **n** | **%** | **n** | **%** | **n** |
| Technological understanding | 26.9 | 60 | 23.8 | 74 | 15.4 | 23 | 31.5 | 51 | 26 | 61 | 24.4 | 73 | 25.1 | 134 |
| Economic impact | 22 | 49 | 25.1 | 78 | 32.9 | 49 | 17.9 | 29 | 21.3 | 50 | 25.8 | 77 | 23.8 | 127 |
| Public accountability/governance | 26.9 | 60 | 31.8 | 99 | 26.2 | 39 | 37 | 60 | 31.5 | 74 | 28.4 | 85 | 29.8 | 159 |
| Public opinion/engagement | 4.5 | 10 | 4.5 | 14 | 7.4 | 11 | 1.9 | 3 | 6.8 | 16 | 2.7 | 8 | 4.5 | 24 |
| Social progress | 4.5 | 10 | 2.6 | 8 | 2.7 | 4 | 2.5 | 4 | 2.1 | 5 | 4.3 | 13 | 3.4 | 18 |
| Middle way/alternative path | 0.4 | 1 | 0.6 | 2 | 0 | 0 | 1.2 | 2 | 0 | 0 | 3 | 3 | 0.6 | 3 |
| Conflict/strategy | 12.6 | 28 | 9.6 | 30 | 15.4 | 23 | 4.3 | 7 | 11.1 | 26 | 10.7 | 32 | 10.9 | 58 |
| Morality/ethics | 1.8 | 4 | 4 | 1.3 | 0 | 0 | 2.5 | 4 | 0.9 | 2 | 2 | 6 | 1.5 | 8 |
| Pandora's Box/Runaway Science | 0.4 | 1 | 1 | 3 | 0.7 | 1 | 1.2 | 2 | 0.9 | 2 | 0.7 | 2 | 0.7 | 4 |

*Table 4.2 – Distribution of Attributes*

| | *National (n=223)* | | *Regional (n=311)* | | *TX & LA (n=149)* | | *PA & OH (n=162)* | | *Conservative (n=235)* | | *Liberal (n=299)* | | *Total (N=534)* | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Reasons to Support** | **%** | **n** | **%** | **n** | **%** | **n** | **%** | **n** | **%** | **n** | **%** | **n** | **%** | **n** |
| Economic | 54.7 | 122 | 29.3 | 91 | 34.6 | 56 | 23.5 | 35 | 43 | 101 | 37.5 | 122 | 39.9 | 213 |
| Technological | 26.5 | 59 | 25.1 | 78 | 19.1 | 31 | 31.5 | 47 | 32.8 | 77 | 20.1 | 60 | 25.7 | 137 |
| Political & Reg. | 25.6 | 57 | 18 | 56 | 24.7 | 40 | 10.7 | 16 | 21.7 | 51 | 20.7 | 62 | 21.2 | 113 |
| Ecological | 48 | 21.5 | 14.8 | 46 | 14.8 | 24 | 14.8 | 22 | 18.7 | 44 | 16.7 | 50 | 17.6 | 94 |
| Local | 31 | 13.9 | 59 | 19 | 20.4 | 33 | 17.4 | 26 | 17.4 | 41 | 16.4 | 49 | 16.9 | 90 |
| | | | | | | | | | | | | | | |
| **Reasons to Oppose** | **%** | **n** | **%** | **n** | **%** | **n** | **%** | **n** | **%** | **n** | **%** | **n** | **%** | **n** |
| Ecological | 46.2 | 103 | 26 | 81 | 35.8 | 58 | 15.4 | 23 | 36.2 | 85 | 33.1 | 99 | 34.5 | 184 |
| Economic | 20.2 | 45 | 8 | 25 | 7.4 | 12 | 8.7 | 13 | 12.3 | 29 | 13.7 | 41 | 13.1 | 70 |
| Political & Reg. | 39.5 | 88 | 43.7 | 136 | 47.5 | 77 | 39.6 | 59 | 47.1 | 112 | 37.5 | 112 | 41.9 | 224 |
| Technological | 32.3 | 72 | 20.6 | 64 | 25.3 | 41 | 15.4 | 23 | 22.1 | 52 | 28.1 | 84 | 25.5 | 136 |
| Local | 16.6 | 37 | 34.7 | 108 | 27.8 | 45 | 42.3 | 63 | 29.8 | 70 | 25.1 | 75 | 27.2 | 145 |

*Table 4.3 – Distribution of Story Tone*

| | *National (n=223)* | | *Regional (n=311)* | | *TX & LA (n=149)* | | *PA & OH (n=162)* | | *Conservative (n=235)* | | *Liberal (n=299)* | | *Total (N=534)* | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **%** | **n** | **%** | **n** | **%** | **n** | **%** | **n** | **%** | **n** | **%** | **n** | **%** | **n** |
| Negative | 24.7 | 55 | 32.8 | 102 | 34.9 | 52 | 30.9 | 50 | 30.6 | 72 | 28.4 | 85 | 29.4 | 157 |
| Neutral | 33.2 | 74 | 30.2 | 94 | 24.2 | 36 | 35.8 | 58 | 33.6 | 79 | 29.8 | 89 | 31.5 | 168 |
| Positive | 42.2 | 94 | 37 | 115 | 40.9 | 61 | 33.3 | 54 | 35.7 | 84 | 41.8 | 125 | 39.1 | 209 |

# CHAPTER 5

# DISCUSSION

This research examined the ways in which fracking has been represented in both national and local newspapers in the US. More specifically, this research sought to understand how news stories about fracking are structured in terms of frames, issues attributes, and story tone. This research also examined news reports from both national elite and local newspapers, comparing the content of national news coverage of fracking to that of local newspapers, as well as making comparisons based upon newspaper partisanship, seeking to identify significant differences in how fracking is framed within the news.

The date range of the sample attempted to include news articles from as far back as the beginning of 2000, yet no articles matching the search criteria were found until 2003. Thus, Figure 4.1 presents the total number of news articles over an eleven-year period, between 2003 and 2014, clearly demonstrating a small and gradual increase in news coverage between the years of 2000 through 2009, followed by a steep increase in coverage between 2009 through 2012. This increase seems to represent the years in which the issue of fracking had become most salient within both national and regional news coverage. This may be due to the overall decrease in natural gas prices in the US, beginning with a rapid decline in price over the years of 2008 and 2009, with natural gas prices hitting a 7 year low in August of 2009, and then hitting another low in March of

2012 (Natural Gas Prices, 2017). Overall, from the year 2009, coverage of fracking has increased year over year, except for the year of 2013, in which the total number of fracking articles decrease slightly.

Another potential explanation as to the sharp increase in coverage seen after 2009 may involve the release of the documentary *Gasland* in 2010. Scholars have begun to acknowledge the role documentary films play in stimulating debate, shaping public opinion, and encouraging activism (Nisbet & Aufderheide, 2009). Vasi and colleagues (2015), examining the influence of the documentary *Gasland,* found that on the national level, the release of *Gasland* lead to increased public debate over fracking, as well as to an increase in newspaper coverage of the issue. Moreover, local screenings of the film lead to an increase in anti-fracking campaigns, which served to both influence local policymakers, as well as to increase media coverage of fracking within local news outlets (Vasi et al., 2015). While the documentary *Gasland* was seldom mentioned within the sample of coded articles, it is possible that the film's release contributed to increased coverage of fracking within the media; hence the potential increase in news reports beginning in 2010.

The sample also contained a significant increase in the number of articles on fracking between 2013 and 2014 (see Figure 4.1). This increase is in part due to the coverage of the issue of hydraulic fracturing within the *New Orleans Times-Picayune*, as news articles from 2014 represented (72 percent or n = 57) of articles sampled. This anomaly is likely due to aspects of the *New Orleans Times-Picayune* sample[5]. The

[5] In order to achieve a total sample size of at least 65 articles, the Times-Picayune was systematically sampled until achieving a final total of 72 articles, which then represented the entirety (a census) of articles printed within the Times-Picayune matching the search criteria within the selected date range.

dramatic increase in coverage during 2014 was in response to a proposal to construct a frack well in St. Tammany Parrish. The issue was highly contentious, resulting in numerous articles describing the struggle between citizens, local elected officials, and industry representatives. Due to the journalistic style used when covering the issue during 2014, the articles tended to focus upon the conflict/strategy aspect of the issue, which resulted in continual reportage providing updates describing developments in the struggle over the proposed frack well (Varney, 2014).

### 5.1 Frames

Overall, the analysis revealed that the issue of hydraulic fracturing is typically organized around three frames: *public accountability/governance*, *technological uncertainty* and *economic impact.* In national news coverage, the *public accountability/governance* and *technological uncertainty* frames were the most prominently occurring frames, each being equally likely to be utilized in stories about fracking. The second most prominent frame within national news coverage being the *economic impact* frame. Within regional news coverage, the most prominent frame was also the *public accountability/governance* frame.

The prevalence of the *public accountability/governance* frame within news reports was likely driven by public concern over environmental damage and unknown risks to human health. These concerns were perpetuated by ambiguities in both state and federal regulations, involving issues such as industry regulation or environmental protection, wherein jurisdictional overlap has resulted in confusion as to who was ultimately responsible for overseeing the growth of the fracking industry (Burford, 2012).

The perceived lack of regulation and industry corruption combined with reports of water contamination and threats to human health resulted in an issue which embodied a struggle between private interests and the public good (Mineo, 2015). For example, the proprietary nature of the mixtures of chemicals used in the fracturing of new wells has been a major concern among citizen groups, as it is thought to be a significant threat to human health, due to the potential difficulties in treating people who have been exposed to an unknown chemical toxin. In response to these concerns, those within the fracking industry began to work with government regulatory agencies, in an effort to develop a plan to disclose the proprietary chemical constituents of frack fluids to medical personnel, in the event of a medical emergency (Konschnik & Dayalu, 2016; Korfmacher, Jones, Malone, & Vinci, 2013).

A second frame, *technical uncertainty*, has also been used prevalently within news reports on fracking. One reason for this likely involves the need to contextualize news reports on hydraulic fracturing. News stories on fracking often require a general description of the fracking process, which serves to simplify a complex technical operation. The provision of a simplified description provides a context within which to discuss a particular event or issue associated with fracking, which was a common feature of many of news articles utilizing the *technical uncertainty* frame. Previous research suggests that many Americans know little or nothing about hydraulic fracturing (Boudet et al., 2014), thus making a simplified description of the process a necessary aspect of news writing. While many news articles employing the *technological uncertainty* frame were strictly focused upon technical issues, occasionally these articles had alternate

frames embedded within them, but because a majority of the article was devoted to describing the fracking process, the article was coded as *technological uncertainty.*

Another prominent frame within news reports on fracking was the *economic impact* frame. The range of attributes associated with the *economic impact* frame are often employed by political figures when promoting the increased use of fracking. For example, former President Obama in his 2013 State of the Union speech, described the natural gas surplus within the US as providing such benefits as decreased dependence on foreign oil, the creation of thousands of jobs, and the lowering of consumer's energy bills; all of which are made possible through the use of hydraulic fracturing (Helman, 2013).

**Frames: Texas and Louisiana versus Pennsylvania and Ohio.**

When considering the prominence of particular frames within media reports between the oil states of Texas and Louisiana, as compared to the fracking states of Pennsylvania and Ohio, some significant differences were observed. The majority of news stories employed the same three dominant frames as did national newspapers: *economic impact, public accountability/governance*, and *technological uncertainty*, with the addition of a fourth frame, *conflict/strategy*.

News stories for Pennsylvania and Ohio were significantly more likely to use the *technological uncertainty* frame when talking about fracking. This difference may be due to the relative newness of the technology of oil and natural gas production within the region. For example, within the last 10 years, the need to build and integrate highly technical infrastructure, both in and around major metropolitan areas within both Pennsylvania and Ohio, was a common focus of a large number of news articles within

the sample. In contrast, the states of Texas and Louisiana have, for most of the 20th century, been associated with oil and natural gas production. Thus, living within the vicinity of some sort of petroleum infrastructure has, over time, lost much of its news appeal.

Findings also suggest that news stories from Texas and Louisiana were significantly more likely to frame fracking as an *economic* issue, as compared to Pennsylvania and Ohio, with newspapers in Texas and Louisiana utilizing the *economic impact* frame 62.8% (n = 49) almost twice as much as newspapers in Pennsylvania and Ohio with 37.2% (n = 29). This finding is in part due to the prevalence of articles focusing upon economic issues related to local petroleum companies in Texas and Louisiana, as fluctuations in the price of natural gas, and disputes over land and mineral rights threatened the profitability of various companies. Moreover, because several petroleum companies are headquartered near the Dallas Fort-Worth area, newspapers often reported on issues related to investment profitability, discussing the impact of frack-well production and the influence of natural gas prices on stock valuations. These types of articles tended to be strictly economic, and were unique to the *Dallas Fort-Worth Star-Telegram* (Fuquay, 2013).

Another interesting finding suggests news reports from the states of Pennsylvania and Ohio were significantly more likely to discuss fracking as an issue of *public accountability/governance*. This finding may be driven by episodic reports of environmental damage or human health risks, combined with the lack of any research on the long-term risks involved with fracking, which drive the assumption that fracking may be far more dangerous than otherwise believed (Carusothe, 2011). Thus, the resulting

conversation/debate between proponents of fracking, and those who have concerns regarding the safe and responsible implementation of the technology, would likely garner much attention from the news media. Moreover, the need to legislate a potentially dangerous activity before it negatively impacts a large number of people, while also seeking to maximize the benefits of fracking to both the individual and society would certainly be seen as newsworthy. Considering the oil states of Texas and Louisiana, much of the debate regarding regulation and accountability took place in the twentieth century as part of conventional oil extraction, thus it is likely that issues of *public accountability/governance* would not be reflected to such an extent within the findings when compared to news from the states of Pennsylvania and Ohio.

Finally, news reports from Texas and Louisiana were significantly more likely to discuss fracking as an issue of *conflict/strategy*. Again, the use of the *conflict/strategy* frame within media reports from Texas and Louisiana was largely due to reporting of conflict between community activist groups and local politicians in opposition to fracking expansion in a particular area. This was particularly true for St. John's Parrish in Louisiana, in which the small rural community faced the prospect of the first fracking well within the vicinity of the community. A large segment of the sample taken from the *New Orleans Times-Picayune* focused upon the community of St. John's Parrish and the struggle between the area's residents and local government regarding the decision to construct the first fracking well in the area (Varney, 2014).

The conflict over mineral rights in Texas was also a prominent issue within news stories on fracking (Fuquay, 2014, Mar 24). In Texas, gas drilling companies have the right to eminent domain, which gives them the ability to condemn private land that stands

in the way of gas well drilling or to natural gas infrastructure. Many articles discuss conflict/struggles between communities and local government regarding issues related to the construction of petroleum infrastructure, specifically to the quantity of gas lines that are run throughout the city (Fuquay, 2012, Apr 19). The Dallas-Fort Worth metropolitan area has seen over 12,000 fracking wells drilled since 2005, each of which is connected via pipeline (Lee, 2010). Due to the overwhelming development of natural gas resources in metro Dallas-Fort Worth, combined with legislation giving petroleum companies eminent domain rights, the landscape within many neighborhoods is being altered to accommodate natural gas infrastructure. Thus, it was not uncommon to find news stories describing the struggles of citizens unhappy with the developments, urging local government officials to take action, as petroleum industry representatives sought to maintain the status quo (Baker, 2014; Norman, 2010).

While many of the articles coded as having a *conflict/strategy* frame were based upon issues which could also have been coded as issues of *public accountability/governance*, or *technological uncertainty*, local newspapers had a tendency to present these issues within the context of a competition between the conflicting parties, often describing one as having the "upper hand" or deterministically "losing the fight," thereby giving the article a competitive voice, which in turn, highlighted the issue as being a conflict rather than a discussion (Baker, 2014). This is perhaps one explanation as to the prominence of the *conflict/strategy* frame within local news reports.

### 5.2 Issue Attributes

Economic attributes where the most commonly mentioned attributes in support of fracking, in both national and regional newspapers. The economic attribute most coded for within the sample (23.4%) reflected the potential for fracking to increase the availability of natural gas or oil in the US. The second most coded reason to support reflected benefits to the economy (15.7%), which include increased energy security, increased natural gas exports/decreased imports and lower crude oil prices. The third most coded economic reason to support reflected benefits to the consumer (12.7%), including lower overall energy costs, or the reduced prevalence of gasoline price spikes.

Technological attributes were the second most common reasons to support fracking (25.7%). The most common technological reason to support fracking coded within the sample is the assertions within news stories that fracking, as a technology, is safe. When discussing fracking as a technology, news stories often describe fracking technology as being similar to that of conventional oil and gas production, citing the proven reliability of conventional petroleum extraction technologies.

Political and regulatory attributes were the third most mentioned as reasons to support fracking (21.2%). Support from politicians was the most frequently coded reason to support fracking regarding politics. Politicians, ranging from local council members to the President, were often cited in news stories expressing support for fracking. When discussing regulation and legislation on the issue of fracking, news stories often suggested that current regulations were sufficient to curtail abuses by the petroleum industry, or newly passed legislation would, in the future, make fracking safer.

Ecological attributes were mentioned fourth most often as reasons to support fracking (17.6%). When discussing ecological reasons to support fracking, news stories most often presented the claim that ecological risks are minimal, suggesting that threats to ecological resources such as air, soil, and water are minimal.

Local attributes mentioned in support of fracking were mentioned the least of all reasons to support fracking in news stories (16.9%). These types of stories tended to be centered on the economic benefits that fracking brings to local residents as the industry moves into a locale. These benefits most often mention the creation of wealth among individuals who sell or lease drilling or mineral rights. Other reasons to support fracking may focus on the creation of new jobs within a community, or perhaps the overall benefit to local economies, findings which are consistent with local interview data regarding perceived benefits within the community (Schafft et al., 2013).

Of the attributes most often cited in opposition to fracking, political and regulatory were the most common (41.9%). The most often cited reason to oppose fracking involved the lack of sufficient federal, state, or local regulation of the fracking industry. News stories of this type tend to focus upon issues such as a lack of restriction upon chemicals used in fracking or lax regulations regarding wastewater disposal. This was particularly true for news stories from the states of Pennsylvania and Ohio. As the fracking boom began in Pennsylvania, much of the industry's waste water was being shipped to Ohio for disposal, spurring the discussion of waste disposal in Ohio. Ohio struggled to regulate the flow of waste water into the state due to Federal commerce protections which forbid one state from imposing tariffs or bans on legally shipped commodities from other states, thereby fueling the discussion surrounding both the lack

of regulation at the state level, while also highlighting the regulatory conflict due to state and federal regulatory overlap (Finnerty, 2014). Other news stories citing political and regulatory reasons to oppose fracking were centered on a political figure's resistance to, or opposition of the commencement of fracking industry activities at the state or regional level.

Ecological attributes were mentioned second most often as reasons to oppose fracking (34.5%). Stories mentioning water pollution were most commonly coded among ecological attributes, supporting recent research which cited water pollution as being central to stories on fracking (Habib & Hinojosa, 2016).

Local reasons to oppose fracking were mentioned third most often (27.2%). Of these, water pollution/threat to local drinking water was also most prominently featured within news stories. Other frequently mentioned attributes include air quality issues, increased truck traffic/damage to infrastructure, and soil pollution. These findings are consistent with research utilizing interview data of local residents in rural Texas and Pennsylvania regarding perceived impacts of fracking within the community (Theodori, 2009; Schafft et al., 2013).

Technological attributes were mentioned fourth most often as reasons to oppose fracking (25.5%). The most prominently mentioned technological attribute in news stories involved the assertion that fracking technology is unsafe or unproven.

Economic attributes were found least often within anti-fracking reportage (13.1%). The most common economic reason to oppose fracking cited within newspaper coverage involved assertions that natural gas had become unprofitable due to a surplus in the domestic supply, largely as a result of fracking. One explanation reflected in the data,

reveals the absence of this attribute within news reports before 2009, which is also the year in which natural gas prices hit a short-term low due to a production glut (Natural Gas Prices, 2017).

**Attributes: National versus Local.**

In comparing the prominence of reasons to support fracking between national news coverage and local news coverage, national newspapers were statistically more likely to mention economic, ecological and political regulatory reasons to support fracking compared to local news coverage. Both national and local newspapers were equally likely to feature either technological or local community-level attributes to support fracking.

Considering reasons to oppose fracking, national newspaper coverage was statistically more likely to mention economic, technological, and ecological reasons to oppose fracking compared to local newspaper coverage. Local newspaper coverage was significantly more likely to mention local community level reasons to oppose fracking. Both national and state-level newspapers were equally likely to feature attributes regarding political and regulatory issues in opposition to fracking.

These findings make sense considering that issues reported at the national level are chosen based upon relevancy to a broad readership. For example, the economic benefits of fracking would be particularly newsworthy to a national audience, such as impacting the geopolitical power balance through decreased energy imports. Similarly, reportage of ecological benefits, such as the potential benefits of natural gas in reducing greenhouse gas emissions, made possible through hydraulic fracturing, would be particularly newsworthy at the national level. While local news reportage, which tends to

focus upon issues most relevant to the community (Hamilton, 2004), would be more likely to focus on community level reasons to oppose fracking, such as damage to infrastructure, or increased truck traffic, both being issues having limited appeal to a national audience.

In considering the differences between national and local newspapers, it is important to also take into account the influence of the availability of resources upon the production of news. For example, national newspapers are better staffed and funded, they can afford having larger news holes to analyze and discuss an issue, as well as employing journalist who specialize in reporting on science and technology issues (Weigold, 2001). Therefore, national newspapers may tend to provide more in-depth issue analyses, examining a broader range of reasons to support or oppose an issue. In contrast, local newspapers tend to have smaller budgets and less access to information subsidies, which may result in a more straightforward presentation of news content that lacks the depth of coverage, or expert analysis regarding the pros and cons of an issue, which is more typical of national newspaper reporting. Thus, local news reportage may tend to focus on reporting straight news and stories thought most relevant to its readership (Hamilton, 2004).

**Attributes: Pennsylvania & Ohio versus Texas & Louisiana.**

A comparison was made seeking to reveal differences in the prevalence of attribute within news reports on fracking between the regions of Texas and Louisiana and Pennsylvania and Ohio. Considering reasons to support fracking, newspapers in Pennsylvania and Ohio were more likely to feature attributes based upon *economic* or *political/regulatory* reasons, whereas newspapers from Texas and Louisiana were more

likely to feature technological reasons to support fracking. As stated previously, economic benefits are likely to appeal to a majority of a newspapers readership, whether it involves the creation of new jobs, or potential investment opportunities. The prevalence of *political/regulatory* attributes may be explained through reportage of political figures discussing legislation, either proposed or existing, while speaking out in support of the growth of fracking within the area. The prevalence of technological attributes supporting fracking, found within news reports from Pennsylvania and Ohio, may in part be explained by reports of construction of natural gas refineries, as well as other related shipping and storage facilities as a result of the rapid growth of the petroleum industry due to hydraulic fracturing within these areas. These sort of news stories often describe the benefits of fracking in terms of technological developments made possible by the rapid growth in frack well drilling in the area, or may describe the need for such developments so as to take advantage of the natural gas surplus as a result of fracking.

Considering reasons to oppose fracking found within reportage from each of the selected regions, news stories from Pennsylvania and Ohio were more likely to present attributes based upon *technological* or *ecological* reasons. These findings may be explained by the relative newness of hydraulic fracturing within both Pennsylvania and Ohio, as both the uncertainty regarding the safety of hydraulic fracturing technology, as well as the potential negative ecological impacts were likely the most news worthy aspects of the issue, being that both pose the most significant long-term threat to the region's environment. Newspapers in Texas and Louisiana were more likely to feature local community level reasons to oppose fracking. This finding may be explained by the issues experienced during the latter stages of natural gas recovery, which involves

significant impacts on air quality, excessive noise from natural gas compressor stations, and the proliferation of natural gas pipeline infrastructure needed to connect every single wellhead.

This study hypothesized that newspapers from Texas and Louisiana would be less likely to mention reasons to oppose fracking based upon threats to the environment. The study also hypothesized that newspapers in Texas and Louisiana would be less likely to mention reasons to oppose fracking as compared to newspapers in Pennsylvania and Ohio. Theses hypotheses were based upon the assumption that, because Texas and Louisiana already have extensive infrastructure for petroleum extraction and refinement in place, residents from these areas would be accustomed to the ecological impact of petroleum extraction. Moreover, for over 100 years, the petroleum industry has been a significant contributor to the economies of both Texas and Louisiana, therefore any potential threats to the environment posed by petroleum extraction may be seen simply as the cost of doing business by the residents of this region. What is more, residents of Texas and Louisiana would likely view fracking as simply an expansion of a prominent industry that could further strengthen the region's economy. Finally, environmental mishaps and industrial accidents are likely far more common in Texas and Louisiana, and thus less likely to be deemed newsworthy by the media, whereas environmental threats posed by industrial expansion in Pennsylvania and Ohio, are much less common and therefore would be much more likely to be deemed newsworthy by the media. Both of these hypotheses were supported by the data.

Findings also suggest conservative newspapers were significantly more likely to mention technological reasons to support fracking, while also being more likely to

mention political/regulatory reasons to oppose fracking. News reports focusing on the benefits of the increased use of hydraulic fracturing technology, balanced against reporting of regulatory issues, such as political resistance to the use of fracking were not uncommon in the sample. These results are consistent with recent research suggesting that Republicans tend to favor a free-market economy, down-play potential risks to the environment, and oppose regulation concerning the use of fossil fuels (Boudet et al., 2014; Clarke et al., 2015).

**5.3 Tone**

Overall, the tone of news stories about fracking were found to be more positive than neutral or negative. In comparing the tone of stories between national and local news sources, both national newspapers (42.2% N = 94) and local newspapers (37% N=115) were overall positive toward fracking. A comparison between the states of Texas and Louisiana and Pennsylvania and Ohio found the tone of news stories from the states of Texas and Louisiana to be more positive (40.9% N=61), whereas stories from the states of Pennsylvania and Ohio were more neutral (35.8% N=58). Overall, when comparing the tone of fracking stories between liberal and conservative news source, both sources tended to report the issue more positively, although there were no significant differences found between sources.

Altogether, these findings are similar to other news framing studies of science communication issues, such as the framing of bio-fuels in the media, an issue which was also presented largely in terms of policy, technology and economics (Kim et al., 2014). The similarities between fracking and bio-fuels with regard to the dominant frames found within media content are likely due to the similarities between the two technologies. Both

technological innovations involve the use of proven technologies, such as petroleum refinement or conventional petroleum extraction techniques. Both issues involve impacts to the economy, in terms of national energy security, as well as to industry and to the consumer. Also, each technological innovation presents unique regulatory and policy hurdles, which must be overcome as each new technology becomes more widely adopted.

While the issue of fracking has a strong ecological aspect, which presents the potential for significant environmental damage, frames such as *morality/ethics* or *runaway science/Pandora's box* were almost nonexistent within the sample; both being frames which dominate the environmental issue of climate change (Nisbet, 2010). This difference may be due to the limited scientific understanding of climate change, as compared to the relatively straight-forward nature of the negative environmental impacts of energy technologies, such as fracking. The causes of climate change are nebulous, and oft contested politically (Nisbet, 2010). Many of the dangers of fracking are both short term, and can be understood as being caused by technological shortcomings, which can be readily addressed through improvements to existing problematic technologies. For example, much of the environmental damage which characterized fracking at the turn of the century was largely due to open-pit wastewater storage, and poorly designed wellhead casings, which were found to contribute to both water and soil pollution within the vicinity of wellheads during the drilling process (Ingraffea, Wells, Santoro, & Shonkoff, 2014). These issues were quickly addressed, through the use of wastewater storage tanks and improvements in well-casing technologies, changes which significantly reduced the potential for environmental contamination during the drilling process (Kuwayama, Roeshot, Krupnick, Richardson, & Mares, 2015).

This study found the overall tone of fracking stories to be positive, findings which conflict with those of recent research that found the overall tone of fracking stories to be neutral within national elite newspapers (Habib & Hinojosa, 2016). Similarly, a second study comparing the tone of fracking stories based upon newspaper partisanship, also found no significant differences in the tone of fracking stories, although the tone of the stories analyzed were negative overall (Beresford, 2014). Although each of the conflicting studies examined the issue of hydraulic fracturing within the news, both relied on a unique methodology and did not provide a clear description of how the tone variable was measured. Thus, these differences are likely the result of differing operationalizations of the tone variable within each of the conflicting studies, thereby highlighting the need for a standardized means of operationalization within the literature concerning quantitative content analysis.

# CHAPTER 6

# CONCLUSIONS

## 6.1 Limitations and Future Research

At this point it is important to discuss some of the limitations of this thesis research. As this study specifically analyses media content, it lacks the power to infer characteristic to the content source, or to anticipate message outcomes (Neuendorf, 2002). A framing analysis cannot answer questions of causality, but simply describes the prevalence of various aspects of media content resulting from the news framing process. Moreover, content analysis cannot answer questions regarding the effects of mass media messages on audiences. Therefore, the results of this study are limited to describing text and examining various characteristics of media messages.

Limitations in study design include neglecting to take into consideration the possibility of comprehensively coding for various aspects of frame building, which may have been present within media content. By coding for the prevalence of particular actors and information sources appearing within news content, along with the affiliation of each with specific societal institutions, a better understanding could be developed regarding which actors and institutions are promoting which aspects of the hydraulic fracturing issue within the news. Therefore, future research might focus upon developing a sound understanding of the various political elites, and other actors which exert influence upon the production of news.

## 6.2 Implications of Research

Through the development of a comprehensive picture of the issue of fracking, as it has been framed within both national and local news media, this research has yielded a variety of findings generalizable to the larger body of framing research, as well as to the topic of hydraulic fracturing within the academic literature. This thesis research also contributes to the literature of mass communication research in two significant ways. First, this research contributes to the literature of content analysis, through the replication of a technique of organizing media content based upon a definition of framing proposed by Ghanem (1997), which provides an organized means of content categorization, allowing media to be organized along thematic, cognitive, and affective dimensions, such that the resulting analysis might measure the prevalence of issue frames, issue attributes (that serve to support or oppose an argument), and the overall tone of news media content (Kim et al., 2014). Secondly, this research contributes to the literature of science communication, as it applies the typology of frames proposed by Matthew Nisbet, thereby helping to establish a consistent base of organizing themes, which have been found to occur across science communication issues (Nisbet, 2009a; Nisbet, 2009b; Nisbet, 2010; Nisbet et al., 2003; Nisbet & Scheufele, 2009).

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