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# Ethanol in the media agenda: The life cycle of an issue in different geographic areas

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**Ethanol in the media agenda:  
The life cycle of an issue in different geographic areas**

by

**Shoshana Hebshi**

A thesis submitted to the graduate faculty  
in partial fulfillment of the requirements for the degree of  
MASTER OF SCIENCE

Major: Journalism and Mass Communication

Program of Study Committee:  
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## ABSTRACT

The rise of ethanol as a fuel alternative has come with much controversy over its true benefits. Much of this debate has been played out in the media. This study aims to determine patterns in media coverage of ethanol through a content analysis of reports published from 1999 to 2008 in three newspapers whose respective service areas exhibit different dispositions about the topic—the *Des Moines Register*, the *Houston Chronicle* and the *Fresno Bee*. The study also aimed to expand on the attributes of coverage within each identified phase of the coverage cycle

The study found only one cycle of pre-hoopla, hoopla, and post-hoopla stages in the sample of 383 articles. The three papers had very similar patterns of coverage, although the *Chronicle* had not entered the post-hoopla stage at the end of the study timeframe. Differences were found among the newspapers in sources cited. During the pre-hoopla period, the most-quoted sources were politicians. Ethanol industry workers were heavily quoted throughout the hoopla periods. The majority of the articles in the *Register* and the *Bee* had at least one local source, while more than half of the *Chronicle*'s stories did not have local sources. Contrary to previous studies, the initial sources in this study were political figures, government officials and ethanol industry workers rather than scientists. The predominance of political, industry, environmental and economic frames in all papers suggests that the ethanol issue was portrayed less as a scientific issue. Only the *Register* exhibited a consistent positive tone throughout the coverage phases.

**Key words:** ethanol, content analysis, framing, hoopla effect, local news, media coverage cycle

## CHAPTER 1

## INTRODUCTION AND STATEMENT OF THE PROBLEM

In 2005 Congress passed President Bush's Energy Policy Act, which injected new life into biofuels production, particularly corn-based ethanol. The Act created incentives for biofuels production, distribution and consumption, and also required refiners to blend "renewable fuels" into gasoline (Lewis, 2006, para .1). It subsequently increased tax benefits and federal subsidies to Iowa corn farmers and ethanol producers. Ethanol became the cure to ward off global warming and make the United States energy independent.

Two years later, Iowa's new governor, Chet Culver, delivered an inaugural address that proclaimed the state would lead the world in the production of renewable energy. He imagined a state of energy independence fueled by ethanol and other biofuels. "There is an energy frontier open before us, and we must explore it immediately! America and the world are counting on us," Culver declared on Jan. 13, 2007. With confident anticipation, Culver mirrored the optimistic outlook for the biofuels industry in corn-rich Iowa being played out in the local press.

A week-and-a-half later, the *Des Moines Register*—the newspaper of record in Iowa—reported that during his 2007 State of the Union address, President Bush included a national energy proposal that highlighted corn-based ethanol. This pleased Iowa legislators (Norman, 2007). Yet, a *New York Times* article published later that week speculated the clock was ticking on corn-based ethanol production (Barrionuevo, 2007).

Ethanol and the country's top corn producer—Iowa—were in the political and media spotlight. The *Register* cited coverage of biofuels—specifically ethanol—as the

issue to receive the most ink in that paper in 2006. The *Register's* business editor wrote, “During 2006, hardly a week went by when there wasn’t significant news about ethanol. Sometimes it was new research. Sometimes it was about new plants or investments.” He referred to ethanol production as a way to dramatically improve Iowa’s economy the same way hybrid corn transformed the state in the early 20<sup>th</sup> century (Elbert, 2006).

But, depending on which media market people find themselves in, and which newspaper covers that market, the picture presented of corn-based ethanol as a viable alternative to gasoline has varied from critical to praiseworthy.

When the news media cover an issue—specifically a new and complex scientific issue of national importance—a predictable cycle of coverage evolves that portrays the topic as positive, neutral or negative. Coverage tends to be positive at the outset, then balances out and may even tip toward the negative until coverage drops off altogether and the cycle closes (Abbott & Eichmeier, 1998).

Within this cycle, media outlets in different media markets may cover the same topic with different slants depending upon the sources they quote and the audiences they serve. Coverage also may be lighter in one market where the population is less affected by the issue, while coverage in another market that is heavily affected by the issue may be much heavier.

The way the media cover a topic can influence public perception and public policy. In the case of ethanol as an alternative to gasoline, the media have both trounced and touted the issue over the years. In Iowa, especially, where Gov. Culver has positioned the state to become “the energy capital of the world” (Jan. 13, 2007), ethanol has been hailed as a boon for the state’s economy and political stature, and media coverage has

remained fairly positive. At the same time, coverage in other markets with less of an interest in ethanol may have been more neutral or negative.

Over time, ethanol has crossed over from being seen as a scientific innovation to an issue that has social, economic, political and environmental impact on the country. In general, the way the media present information has many implications. It can be surmised that media coverage of ethanol has affected the time, money and energy invested in bringing it to the table as a viable alternative fuel. When coverage is positive, the budding ethanol industry appears to be a savior for this country's dependence on foreign oil and a provider of relief from high gas prices for consumers. When coverage has included negative aspects of ethanol, the industry appears to have misled the public and the government toward a "Band-Aid solution," which shows ethanol as a short-sighted alternative that will benefit the power players immediately but not the consumers in the end. Ethanol has been made to look no better—if not worse—than gasoline (Davey, 2007; Romm, 2007).

In looking at the cyclical pattern of ethanol coverage in newspapers, it can be observed that since ethanol was introduced around the mid-1800s, there have been events that have triggered a surge of media coverage of the topic.

The current study examines a period of time that includes one such surge beginning in 1999, when the Environmental Protection Agency (EPA) recommended that the gasoline additive methyl tertiary butyl ether (MTBE) be phased out nationally and promoted ethanol as its replacement. The analysis concludes with coverage ending in 2008, following the presidential election. A 10-year look at this cycle of coverage shows spikes and lulls when ethanol comes onto the media's agenda, but a deeper content

analysis of the articles reveals the tone of the coverage, the main sources quoted and the frames used to describe the issue.

A hypothesis about the cycle of media coverage of scientific and technological issues and a theoretical framework (framing) was used in analyzing data. First, it is hypothesized that media coverage in the beginning of an issue cycle would be overwhelmingly positive and sourced mainly by scientists and industry managers. As time moves on and more diverse sources are quoted, news coverage escalates and develops a more critical or negative tone. Eventually the issue runs its course and fewer stories are published. As coverage tapers, the tone becomes neutral, and science-based sources are cited less frequently.

Second, following the axioms of framing theory, it is hypothesized that the extent to which a topic such as ethanol is relevant to a specific region will have a bearing on how the media frame the issue. Entman (1993), who helped establish the theory, says, “Frames call attention to some aspects of reality while obscuring other elements, which might lead audiences to have different reactions” (p. 55). One can therefore suspect that there will be coverage differences between the Iowa media and non-Iowa media, and that these differences may play a role in public acceptance or rejection of the issue. Thus, it is assumed that coverage helped shape the ethanol debate.

To test this second hypothesis, this study compares media coverage of ethanol in three newspapers that are representative of varying geographic and economic areas in the United States. The purpose is to determine if coverage remains positive for a longer period of time in a place where the issue has more saliency.

Comparing the coverage of ethanol across three states also aims to illuminate differences in the cycles of coverage in different geographic areas—marking the duration of an issue’s positive, neutral and negative coverage. This research also examines the sources that contributed to the newspaper reports. Noting which sources fed which stories during what time period sheds light on how the media have framed this issue over time.

In Iowa, where much is at stake concerning ethanol, the coverage will presumably remain positive for a longer period of time because its government and industry have poured millions of dollars into ethanol production and publicity. With Gov. Culver’s focus on biofuels and ethanol, and the federal government’s ongoing subsidies to Iowa farmers who are growing corn for and producing ethanol, local media coverage would reflect a more positive sentiment. This can be discerned in the *Des Moines Register* that has dedicated considerable resources to covering ethanol.

Elsewhere, coverage might reflect a more neutral or balanced picture. In California, where ethanol was first seen as a replacement for MTBE, coverage from the *Fresno Bee*—a medium-sized newspaper in a predominantly agricultural area—is expected to look more critically at ethanol because the area is not as invested in producing the fuel. California is also seen as a trendsetter on environmental policy, and was quick to discredit ethanol as a viable alternative to gasoline.

The *Houston Chronicle*, the third newspaper analyzed, offers a window into a region of Texas that has a fair amount of oil production and a strong presence of oil interests, which often compete with ethanol. The *Chronicle’s* coverage of ethanol is expected to lend balance and perspective to this study.

The results of this study can help media researchers and members of the media illuminate what is likely to happen to the sources of information and the tone of coverage as a scientific issue runs its course. This study also attempts to advance researchers' understanding about why national issues are portrayed differently in various parts of the country, and what factors might shape coverage. As the newspaper industry shrinks and becomes more Internet-oriented, the way a regional or local newspaper covers an issue may have important implications in the way people get their news. A regional or local focus brings more context and offers a unique perspective to readers rather than the large brush used to paint national issues in a globalized and increasingly hegemonic information society.

## CHAPTER II

### LITERATURE REVIEW AND THEORETICAL FRAMEWORK

Since the turn of the 19<sup>th</sup> century, when ethanol was first introduced as a combustible fuel, there have been a series of events that have triggered a surge of media coverage of this alternative fuel. These surges appear to be part of a cyclical pattern that characterizes scientific or controversial issues covered by the mass media.

#### **Cycles in media coverage of scientific issues**

Oil and energy consumption in the United States has been a hot topic in the press for many years. When the oil-producing nations assembled together in the mid-1970s to form what is now known as the Organization of Petroleum Exporting Countries (OPEC), which is essentially an oil cartel, the price of oil skyrocketed, pushing alternative fuels into the U.S. media and policy agenda. Coverage, however, slumped as the price of oil stabilized in the world market. When oil prices hit unprecedented levels again in 2007 and 2008, topping \$100 a barrel, and as Americans began paying on average \$3 and \$4 per gallon of gasoline, the nation again turned its attention to the prospect of alternative fuels. Ethanol production has hit an all-time high in this country, with the corn-belt states in the Midwest supplying the bulk. As anxiety about oil prices grew, so did coverage of ethanol. Hence, another cycle of media coverage of ethanol was well underway.

Cyclical coverage exists when any controversial issue is played out in the media. Ethanol is no exception.

The hoopla effect states that coverage will likely begin at a low level and then increase in an “optimistic crescendo” before it declines (Abbott & Eichmeier, 1998, p. 2). The hoopla hypothesis categorizes media coverage into three stages: (1) pre-hoopla—

characterized by a low level of coverage focusing on the scientific aspect of the innovation; (2) hoopla—seen when a spike in coverage touts the issue; and (3) post-hoopla—when coverage drops off and includes more critical or negative assessments of the issue.

The hoopla effect presumes that coverage of a scientific issue in the beginning of a cycle would be heavy and overwhelmingly positive, sourced heavily by scientists and industry “spin doctors” who are trying to get their message across. As time moves on and competing sources come into the picture, news coverage peaks with the coverage becoming more controversial and more neutral or negative in tone. Eventually, coverage begins to slow and the cycle closes (Abbott & Eichmeier, 1998).

Yarbrough (1989) thought the hoopla effect could be extended as a framework for analyzing media coverage of other scientific innovations. Later, Abbott and Eichmeier (1998) used the same framework to analyze media coverage of a technological innovation (videotex/teletext), a scientific health-benefit claim (oat bran), and of genetically modified organisms (Abbott & Eichmeier, 1998).

The hoopla effect was informed by other studies that have examined cycles of coverage to enhance prediction. McQuail (2005) contends that much research has shown a stable and predictable pattern in news coverage. An example is the work of Downs (1972), who studied the coverage cycles of environmental issues. Downs’ “issue-attention cycle” identified five stages of coverage: (1) the pre-problem stage—wherein an undesirable social condition is yet to enter the public sphere of attention though some experts might already be alarmed; (2) the alarmed discovery and euphoric enthusiasm stage—at which point the public becomes suddenly aware of the problem; (3) realizing

the cost of significant progress—this stage is reached when people understand that the cost of “solving” the problem is high and groups in society must make sacrifices; (4) gradual decline of intense public interest—when people realize the complexity of the problem and lose interest; and (5) post-problem—when the issue moves into limbo, receiving little or sporadic interest.

Other cycles of media coverage have been documented in past studies. Rogers, Dearing and Chang (1991) observe a cyclical change in the media’s attention to issues. When new interpretations or information about a topic gain enough “news value,” coverage spikes temporarily until a new “trigger” elicits more coverage. Their study noted four stages in the coverage cycle: (1) the initial era—characterized by little media attention; (2) the science era—when scientists become heavily cited as information sources; (3) the human era—when the issue becomes “personalized” in media coverage; and (4) the political era—when coverage focuses on the issue’s political dimension and policy implications.

The Energy Policy Act of 2005, which in effect doubled ethanol production, acted as a triggering mechanism to pull ethanol into the media spotlight after it had been cast aside as “a joke to much of the nation” (Elbert, 2007, p. 1D). Thus, with this piece of legislation, the most recent “hoopla” cycle of ethanol newspaper coverage began.

Downs (1972) argues that most issues inherently foster cyclical media attention, and journalists can “exert quite a bit of control” over the presentation of issues (Brossard et al., 2004, p. 363). The attention the media currently gives and has given to environmental concerns is a case in point. Downs (2008) explains that a problem must be “dramatic and exciting” to remain in the public sphere, characterizing attention to environmental issues today as being midway through the issue-attention cycle.

## **Framing**

An analysis of the media's coverage of ethanol can also be informed by framing theory. Media frames help audiences sort out the issue's relevance and serve to measure its controversy. Entman (1993), who is among the first to offer the basic axioms of this theory, says "Frames call attention to some aspects of reality while obscuring other elements, which might lead audiences to have different reactions" (p. 55). In other words, the tenor of coverage could play an important role in shaping public perception of an issue and whether the public accepts or rejects the issue. Thus, the nature of the coverage can help shape the debate.

Entman (1993) describes four "frame locations" in the communication process: (1) the communicator—those who make conscious framing judgments; (2) the text—words and other communication devices that contain frames, which provide "thematically reinforcing clusters of facts or judgments"; (3) the receivers—whose understanding of the message is guided by their thinking and not necessarily the communicator's frame; and (4) the culture—that provides a "stock" or "set" of common frames, which people in a social grouping reference (pp. 52-53).

Framing theory also suggests that the media help create saliency for certain issues as they cast the story in a certain angle to explain events (Crawley, 2007).

Among journalists, framing is "almost unavoidable" (McQuail, 2005, p. 379). This is so because, according to Van Gorp (2007), reporters are unable to "perceive objective reality" and must bring order and selection to the chaos of news (p. 67). Framing allows the media to reach beyond simplistic concepts of pro/con or negative/positive to include more complex associations. Framing, in this sense, can define an issue and "set the terms of the debate" (Tankard, 2003, p. 96).

Miller and Riechert (2003) propose a four-stage framing cycle. In the first stage of this cycle that they call the emergence phase, journalists tend to cover an issue that takes on certain newsworthy qualities, such as conflict or timeliness. This phase of reporting is often ignited by a triggering event. The second stage, the definition/conflict phase, occurs when the issue is placed on the public agenda and stakeholders begin to find ways by which the news can be shaped to their advantage. Conflict among stakeholders is the main attribute of this phase. The third stage is the resonance phase during which the frames of stakeholders begin to resonate with the public. Stakeholders whose messages do resonate have the ability to drown out conflicting messages at this point. The fourth stage, the equilibrium or resolution phase, occurs when a single frame dominates the debate. This final message acts as a hegemonic device on the media and defines the situation “for the record” (pp. 111-113).

This study examines frames located within media texts and submits that the salience of an issue to a specific geographic region influences the ways in which ethanol has been framed by the media that service that region.

### **Source framing**

McQuail (2005) says the sources cited in news content have great power in framing the news, and “the more powerful the source and the more control there is of information flow, the more extra-media influence there is on the framing process” (p. 379). Regarding ethanol coverage, it is important to compare sources and attributions in different media to establish at what point in the coverage cycle they inject frames and shape the story toward their points of view.

In this respect, one cannot ignore the role of powerful sources in setting the media agenda on certain topics and also in setting the frame through which issues are understood. Organizations, governments and individuals that hold a stake in the success

of an idea, product or innovation can present information in ways that shape news coverage in their favor (Miller & Riechert, 2003).

According to Valenti (1999), beat journalists—those covering a specific beat, such as the environment, agriculture or the ethanol and renewable fuels industry—are more likely to seek out the “expert” opinions of government or academic scientists rather than business or industry scientists. These journalists also tend to rely heavily on non-scientific sources, such as politicians and government officials, and they are less likely to include information from advocacy groups, such as environmental groups or consumer advocates (p. 176).

According to the hoopla effect, scientific sources can add to the positive surge of news in the early coverage stages and continue to promote positive angles into the later stages of the cycle (Abbott & Eichmeier, 1998). The sources who contribute to a media report have a large role in shaping the debate; they can heighten the level of controversy and increase the amount of coverage an issue receives.

Shoemaker and Reese (1991) introduced a hierarchical model of influence that helps to explain the role of sources in framing the news. Not only are journalists influenced by their own routines of newsgathering, plus their inherent biases, backgrounds and culture, but outside sources also play a significant role in dictating what gets printed. Gans (1979) defines sources as actors who provide journalists with background information and story ideas while also serving as interviewees who are quoted in media reports. “Sources have a tremendous effect on mass media content because journalists can’t include in their news reports what they don’t know” (Shoemaker & Reese, 1991, p. 150).

This influence can be subtle in that the source can provide the context by which to frame the story. A source can also “monopolize the journalists’ time” to discourage them to find alternate views (Shoemaker & Reese, 1991, p. 150). In short, sources are not equal, and the extent to which they exert influence contributes to story bias and framing. Shoemaker (2006) adds that information provided by sources with close ties or relationships to journalists has a greater chance of making it into prominent positions in the newspaper than an item that may be considered universally newsworthy.

Nisbet and Lewenstein (2002) note that “if an interest group can control media and public attention to an issue, then it has succeeded in controlling the media and public agenda” (p. 361). The authors say government-affiliated interest groups are most effective in this capacity, as they are most likely to create a newsworthy event for the media to cover. Also influential, they add, are industry groups and their representatives who are well-funded and have the ability to craft information that makes it easy for journalists to meet deadlines. Not only is the information readily accessible—and even spoon-fed—to the media, the professional public relations experts in their payrolls speak the same language as journalists, making for an easier transmission into the news cycle (Gamson & Modigliani, 1989). As the media gobble up industry-slanted information, coverage is likely to follow that slant to the neglect of others (Nisbet & Lewenstein, 2002; Pan & Kosicki, 1993).

### **Localness and regionality**

There may be a bubble, however, when a media outlet in a certain region continues to quote the same sources for a longer period of time, thereby prolonging the hoopla stage, while the media in other regions have already moved on to the post-hoopla stage. Conditions like these may lead to the phenomenon of interpretation hegemony, a

situation in which one dominant frame is used over a long period of time so that the public and the journalists fail to recognize or question it (Tankard, 2003).

In a region that is more affected by a certain issue than another, it is conceivable that this “local story” would receive more media attention and be more prone to adopting a more homogenous tone. This tone may differ to that of the coverage in other media markets where the story is not local.

Structural pluralism theory says that media content is dependent on community structure and imparts a pattern of information control that affects how the audience perceives an issue. In more pluralistic communities, there will be a greater variety of opinion and more criticism of an issue (Harry, 2001). The size and makeup of a community, then, becomes an important factor in the way a story is covered. Smaller, more homogeneous communities have been found to lean toward suppressing controversy from coverage while metropolitan areas tend to emphasize controversy and conflict (Harry, 2001; Taylor, Lee & Davie, 2000).

A second take on localness and regionality comes from Kaniss (1991), who posits that local journalists and sources can shape a story in such a way that the topic becomes a prominent issue outside of the local area. These players also determine how a story is cast before the audience.

“Although long overshadowed by the national media, local news has always played an important role in the way a city and region understands its problems, its opportunities, and its sense of local identity. The primary concerns of local news are often quite different from those which dominate national news and tend to reflect issues that are closer to people’s lives. The factors which influence the coverage of local issues are also quite distinct, resulting from the unique ties that bind the local media to their communities. Metropolitan newspapers, local television and radio stations, and other local media are all intertwined with the economic, social, political, and even

geographical conditions of their local areas in ways that have important implications for the news they cover” (Kaniss, 1991, p. 2).

Local news has been criticized as being less sophisticated than national news—especially when dealing with politics (Farnsworth & Lichter, 2005). Yet, journalists who work for a regional or local newspaper are likely to localize their stories. Editors are more likely to place a story more prominently if it includes a local angle (Valenti, 1999). Page 1 stories, according to one reporter, bring focus onto how the people in the newspaper’s coverage area are being affected by an issue. Chances are, the story will be personalized—told “through the lives of readers” (p. 176).

D’Haenens and de Lange (2001) found that regional newspapers were less likely to use a wire service when the subject is within the vicinity, thereby illustrating the importance and priority of an issue. They also found that in regions where the population felt positively about an issue, the regional newspaper tended to write positive stories or human interest stories about it. The authors call this the “socio-cultural context” (p. 859), a term that can describe the difference in coverage between three newspapers with different service areas. This socio-cultural context can also serve as another “frame” the newspapers use to describe the issue, as in “how ethanol affects Fresno consumer habits.”

### **Intricacies of a scientific issue**

Researchers (i.e., McInerney, Bird & Nucci, 2004) have long known that the public gains knowledge and forms opinions about scientific research first through the media. However, journalistic routines are such that often, “one opinion tends to dominate news coverage” (McQuail, 2005, p. 352).

Many studies have looked at media coverage of agricultural topics, including genetically modified foods, cloning, and food safety issues, which eventually become issues of broader public and political concern. The resulting media coverage of these issues has been predominantly episodic and initially positive (Crawley, 2007) following the attributes of cycle stages as predicted in the hoopla effect.

The hoopla effect posits that early coverage for a scientific story will contain fewer sources and source categories, and those sources will most likely be scientists (Abbott & Eichmeier, 1998). Studies have indeed found that journalists tend to consider scientists credible and authoritative sources; consequently, science is portrayed positively (Brossard & Shanahan, 2003), and scientific frames dominate the coverage. But public perception of credibility seems to be mitigated by the medium to which people are exposed the most. Nisbet et al. (2002), for example, showed that people who read newspapers were more likely to trust science, while people who watch more television had a greater level of mistrust for science.

When journalists begin to quote sources who may not hold the same authority as scientists but aim to criticize the issue at hand as predicted during the hoopla stage, the issue may get distorted in the media and in the public's perception. Scientists may even drop out of the debate altogether at this stage.

This happens, according to Hartz and Chappell (1997), because journalists are more interested in trends and sensationalism than hard science and the intricacies of research. McNerney et al. (2004) say the media often do not provide the full picture of a scientific issue. In fact, they state that media reports are often based on press releases that help "sell" science. In Western cultures, the degree to which an issue carries conflict

enhances an issue's newsworthiness (McQuail, 2005). Ethanol and biofuels have this inherent conflict-carrying capacity that can spur media coverage. Even after the hoopla slows, the media may still emphasize drama as "tensions and conflict dominate the coverage" (Wolfsfeld, Khouri & Peri, 2002, p. 190).

Cohen (1963) proposes that the media do not tell us *what* to think but rather what to think *about*. Lang and Lang (1966) say the media "force attention to certain issues" by presenting what people should "think about, know about, have feelings about" (p. 468). Cognizant of this, it is important to know the history of ethanol and its lifecycle in the media agenda.

### **Ethanol: A definition and brief history**

Ethanol, also called ethyl alcohol, is used as a gasoline additive and alternative fuel. It is a high-octane liquid fuel produced by the fermentation of plant sugars, which, in the United States, is produced from corn and other grain products (Iowa Corn Growers Association, 2007).

It has resurfaced in the mainstream marketplace and the media as gasoline prices have skyrocketed and the effects of burning fossil fuels on climate change are actualizing. There is also a growing sentiment among Americans and the U.S. government that the country should be more self-sufficient in energy. These factors have helped generate discussions about from what sources should the U.S. derive its energy. On this regard, ethanol has been a much-debated alternative.

Despite its recent popularity, ethanol has a rich history. In 1826, Samuel Morey developed an engine that ran on ethanol and turpentine. In 1860, Nicolas Otto, the inventor of the modern internal combustion engine used in automobiles, used ethanol in

one of his engines. Before ethanol was tapped as a transportation fuel, it was used for lighting, but during the Civil War, the Union Congress heavily taxed ethanol, and drove down its use until the tax was repealed 50 years later. In 1896, Henry Ford built his first automobile to run on ethanol; his Model T could run on ethanol, gasoline or a combination of the two. In the 1920s, Standard Oil began adding ethanol to its gasoline to increase octane, and a decade later, the Midwest became a market for “gasohol”—a mixture of between 6 and 12 percent ethanol with gasoline. World War II increased ethanol demand, but once the war ended, the use of ethanol decreased. Until the 1970s, virtually no commercial ethanol was available in the country (Energy Information Administration, 2007a).

During the gas crisis of the 1970s, when high gas prices forced people to favor fuel-efficient cars and research funds were made available to develop alternative fuels, variants of ethanol came back into the picture (Schuon, 1979). Now, 30 years later, as the United States faces record-setting gas prices and increasing gas consumption (Otto & Gallagher, 2001), ethanol is back as a heavily funded and federally subsidized alternative fuel.

Americans in 2006 consumed 388.6 million gallons of gasoline per day, paying an average of \$2.59 per gallon of regular unleaded gasoline (Energy Information Administration, 2007c). Oil prices have risen steadily in 2007, adding more impetus for the discovery and development of alternative energy sources. In January 2007, the price of oil was around \$50 per barrel (NYMEX, 2007). By Nov. 14, 2007, the cost had risen dramatically to \$94 per barrel. By mid-2008, prices peaked at around \$150 per barrel. Gas prices mirrored that increase. In Nov. 12, 2007, the average price per gallon of

gasoline in the United States was \$3.11 (Energy Information Administration, 2007c). By summer 2008, consumers saw prices soar to more than \$4 a gallon (Energy Information Administration, 2009).

Around the world, ethanol is seen as a viable and renewable alternative to gasoline derived from fossil fuels. Brazil, which had the highest rate of production, makes ethanol from sugar cane, a crop the country produces in abundance (Goldemberg et al., 2004). Brazil began its production in the 1970s and has had great success in using ethanol to replace fossil fuel (Grad, 2006). Using molasses and sugarcane, African countries replace lead in gasoline with ethanol (Thomas & Kwong, 2001). In Colombia, a country with important oil reserves, the government is looking at building several ethanol plants to help curb greenhouse gas emissions and reduce dependence on fossil fuels (Quintero et al., 2007).

While tropical countries use sugarcane as the main source of ethanol, the United States and other North American and European countries derive their ethanol from more starchy biomass, such as corn (Quintero et al., 2007). Corn requires more energy to produce than the more cellulosic-based crops, such as fast-growing trees, sugarcane and grasses (Lorenz & Morris, 1995). While the United States pours money into the research and development of ethanol, the media cover the benefits and risks inherent in this process.

The United States produces more corn than any other country in the world, and the state of Iowa is the country's leading corn producer. In 2005, Iowa produced about 2.2 billion bushels of corn, the most the state had ever produced until 2007's bumper crop of 2.4 billion bushels. The state is prime for growing corn because of its climate, the

amount of rainfall it receives, its rich soil, and its abundant livestock waste, which farmers use as fertilizer. According to the Iowa Corn Growers Association (2009), roughly one-third of the state's 2007 crop (812 million bushels) went to ethanol production. About one-quarter of the crop (565 million bushels) went directly to animal feed, and another quarter (555 million bushels) was shipped to other states or other countries. The remainder went to the manufacture of corn products, such as corn starch and corn meal. A bushel of corn can produce 2.7 gallons of ethanol (Iowa Corn Growers Association, 2007).

In 2001, researchers at Iowa State University found that ethanol production grew steadily during the previous 20 years. Before that, ethanol production was virtually nonexistent (Otto & Gallagher, 2001). A 2001 California ban on MTBE—a gasoline additive found to contaminate ground water—pushed ethanol as a soluble replacement, and stimulated the ethanol market. Now, every vehicle sold in the United States is compatible to run on a blend of 10 percent ethanol-90 percent gasoline, also known as E-10 (Iowa Department of Agriculture, 2007).

The ethanol market has been a boon to Iowa's economy. Ethanol production in the state increased from 10 million gallons in 1978 to 1.5 billion gallons in 2006—about one-third of the total amount produced in the country that year. The state boasts 38 ethanol plants, which have a capacity to produce 3.1 billion gallons of ethanol a year. The industry at large has created more than 4,000 jobs for Iowans. The plants provide needed jobs and generate millions of dollars in tax revenue for the state. In 2008, the ethanol industry nationwide contributed \$65.5 billion to the GDP and supported more than 494,000 jobs in all sectors across the country (Iowa Renewable Fuels Association, 2009).

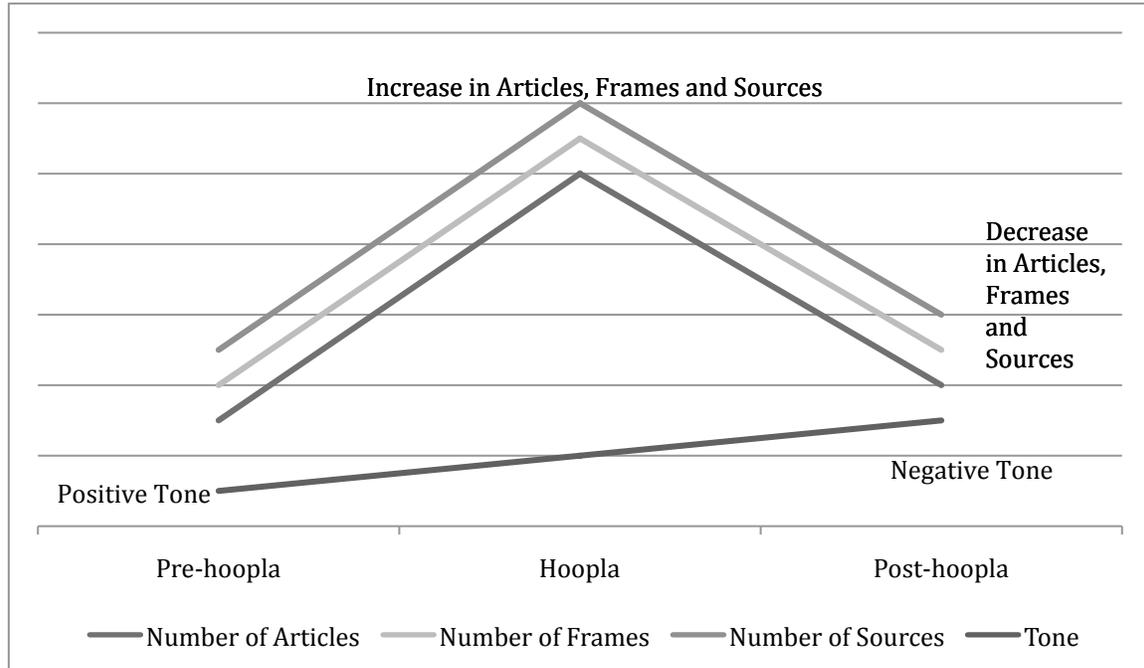
While ethanol has injected a dose of hope and energy into rural Iowa, it remains to be seen whether it will have lasting effects. Critical media reports have cast doubt as to the longevity of this corn-based fuel (Elbert, 2007). As the issue transforms from a relatively narrow one to a broader issue with heavy social and economic implications, the story continues to move through the cycle of media coverage.

### **Research questions and hypotheses**

Figure 1 charts the attributes of the coverage for each hoopla phase as predicted by the hoopla effect hypothesis and Miller and Riechert's (2003) four-stage framing cycle model. Combining these two models' propositions offers the following predictions:

1. During the pre-hoopla period, there will be a small number of articles, sources and frames present. The tone will remain mostly positive during this period.
2. As the study progresses into the hoopla period, the number of articles, sources and frames will dramatically increase, and the overall tone will grow more negative.
3. When the study enters the post-hoopla period, the number of articles published, the frames the stories portray and the sources cited will decline, and the overall tone will again increase in negativity.

**Figure 1. Predicted attributes of ethanol coverage at each stage of the coverage cycle**



Thus, this study poses the following research questions and hypotheses:

RQ1: What is the general **pattern of newspaper coverage** of ethanol from 1999 to 2008? Does the pattern of newspaper coverage differ in Iowa compared to other regions with less of a stake in the success of ethanol?

RQ2: What were the **sources** cited in the news reports? How do the sources differ among the three regions? Do the sources cited change over time as predicted by the hoopa effect?

H1: For both Iowa and non-Iowa newspapers, scientists and other sources who have a positive stake in ethanol will be heavily quoted in the beginning of the coverage cycle, while opponents and critics of ethanol will be quoted in the middle and later stages of the coverage cycle.

H2: The diversity of sources cited will increase as the hoopa effect runs its course.

RQ3: What are the most common **frames** associated with ethanol? Do they differ among the three regions?

H3: For both Iowa and non-Iowa newspapers, the number of news frames present in the coverage will decrease in the middle and later stages of the cycle.

RQ4: What is the **tone** of newspaper reports about ethanol at each of the three hoopla stages?

H4: Newspaper reports about ethanol will be more positive during the first two hoopla stages, and will eventually become negative during the post-hoopla stage.

H5: Coverage in Iowa will remain positive and heavy for a longer period of time than in other regions with less of a stake in ethanol.

## CHAPTER III

### METHOD

A content analysis of newspaper reports was conducted to address the research questions and hypotheses posed in this study. Content analysis is a reliable method with which to investigate the way the media cover a particular issue (Wimmer & Dominick, 2006). In the current study, the objective is to describe how the ethanol issue has been reported in three newspapers with different service areas in terms of intensity, sources cited, frames employed, and tone of coverage at each cycle phase.

#### Study Design

The first objective of this study is to determine whether the coverage of ethanol in three newspapers has followed the cycle proposed in the hoopla effect. A secondary objective is to evaluate what the attributes of the coverage at each cycle phase in terms of the sources quoted in the newspaper articles, the frames the stories displayed, and the tone of coverage at each phase of the cycle over a ten-year period. Third, the study aims to determine the impact of context or region on these attributes. Specifically, this study investigates whether newspapers whose readership has a direct stake in the outcome of the issue will prolong a positive spin. As such, it is predicted that the *Des Moines Register*, a major newspaper published in the Midwest, will publish more articles about ethanol, and will portray the topic in a more positive light for a longer period of time than the *Houston Chronicle* and the *Fresno Bee*, whose audiences are less likely to be interested and directly involved with the success of ethanol as a viable fuel.

The three newspapers were selected for particular reasons: (1) The *Register* is considered the newspaper of record in Iowa, which is the center of the corn belt and the

leading ethanol producer in the United States. Many Iowans are directly involved in some aspect of ethanol production. Ethanol is seen as an economic boon for this state, which relies on farming for a good portion of its industry. The issue has been placed at the top of the governor's political agenda, and it has garnered extensive media coverage. (2) The *Fresno Bee* is a medium-sized paper based in Fresno, Calif.—a town whose roots are based in agriculture. This newspaper has a dedicated farm reporter and is keen on environmental and agricultural issues. The state of California also has a stake in ethanol in that there are a few ethanol plants located in it, one of which is in Madera, a town about 20 miles north of Fresno. (3) The *Houston Chronicle* is based in an area of the United States where there is heavy oil production and oil interests, which compete with ethanol. The region is also a big player in the biofuels industry—another ethanol competitor. Analyzing these regions' news agenda will help shed light on regional differences in coverage.

The three newspapers selected for analysis have medium-sized circulations and are considered regional newspapers.

### **Sample selection**

Data for this study were gathered from articles in each of these three newspapers published between 1999—just before the Environmental Protection Agency announced a plan to phase out the use of MTBE as a gasoline additive and replace it with renewable fuels, such as ethanol—and 2008, following the Nov. 2, 2008 presidential election. The 10-year scope of this study provides adequate representation of articles that cover the ethanol issue from an environmental, political, economic, scientific and social perspective. The sample was derived based on selection techniques that have been used in

previous studies on the hoopla effect (Lacy, et al., 2001; Abbott et al., 2001; Abbott & Eichmeier, 1998).

First, an electronic database search of Access World News was conducted to retrieve all relevant articles from each of the three newspapers during the time period using the search term “ethanol.” In this study, only the lead or first paragraph of the articles was searched to retrieve only the most relevant articles. The total number of articles compiled constituted the sample.

Articles from each newspaper were examined independently. The articles were coded for date of publication, tone, type of sources cited, the frequency with which the sources were cited in each article, and the frame(s) applied in the article. Data collected from each newspaper were compared to find regional differences in (1) patterns of coverage based on intensity or number of stories about ethanol published, (2) the number and type of sources cited, (3) tone of the story, and (4) frames employed.

### **Operational definition of variables**

There are three hoopla time periods as described by Abbott and Eichmeier (1998):

1. **Pre-hoopla**, characterized by little coverage of the issue.
2. **Hoopla**, a drastic increase of the coverage that comes to a peak.
3. **Post-hoopla**, a decline in coverage immediately following the peak.

To determine intensity of coverage and where each article falls in any observed hoopla stage, the date of publication was recorded.

The type of article that discussed the ethanol issue was also coded. In this regard, each article was coded as falling into one of the following categories:

1. **Opinion**, an article published in the newspaper's editorial, op-ed or letters to the editor section.
2. **News**, an article published in the newspaper's news section.
3. **Feature**, a non-news article that is published in the newspaper's features or lifestyle section.
4. **Business**, an article published in the newspaper's business section.
5. **Agriculture**, an article published in the newspaper's agriculture or farm section.
6. **Other**, an article that is published in none of the previous sections. This was recorded as a string variable.

Sources refer to persons, institutions or organizations cited in the news report who contributed facts, data, analysis or interpretations about any aspect of the ethanol issue. The number of sources cited in each article was coded. Then, the sources were coded into the following categories:

1. **Scientist**: A government, university, industry, association or independent scientist.
2. **Farmer**: An individual who considers his/her primary occupation to be farming and may or may not contribute to the production of ethanol either by growing corn or other ethanol-producing crops or by participating in an ethanol co-op or other production or investment facility.
3. **Ethanol industry worker**: An individual who works within the ethanol industry in companies such as Orion Ethanol and Pacific Ethanol. This does not include a farmer who produces ethanol.

4. **Oil industry worker:** An individual who works within the oil industry such as Chevron or British Petroleum. This includes gas retailers.
5. **Other energy industry worker:** An individual who works for a non-ethanol or oil company, such as MidAmerican Energy or Pacific Gas & Electric, which produces energy from sources such as natural gas and coal.
6. **Renewable energy association official:** An individual representing a renewable energy association, such as the Iowa Renewable Fuels Association.
7. **Agricultural association official:** An individual representing an agricultural association, such as the Iowa Corn Growers Association.
8. **Government agency official:** An employee of a government organization, such as the Department of Natural Resources or the Environmental Protection Agency.
9. **Political official:** An individual who is considered an elected politician or a specialized political aide, such as a governor, senator, mayor, governor's spokesperson or communication director.
10. **Educator:** An individual who by profession is an educator or instructor at an educational institution, such as Kim Smith, professor of journalism and mass communication at Iowa State University, or Nicole Smith, a second-grade teacher at Merrill Elementary in Des Moines.
11. **Citizen:** An individual who is not described as an official, farmer or worker in the capacities listed above. This person can be identified, for example, as Joe Ross of Mill Valley, Calif.
12. **Conservation/environmental non-governmental organization worker:** An individual who works for an organization primarily concerned with conservation

or environmental issues, such as Greenpeace, the Sierra Club, or Clean Water Action. These organizations do not receive funding from government agencies at the federal, state or local level.

13. **Other:** An individual who does not fit neatly into any of the above categories.

This person, group or organization will be coded as a string variable. This category was re-analyzed to see if any major group is missing from the included list of sources.

Tone, the equivalent of a story's valence, was coded as:

1. **Positive:** Some positive tone is present in the story.
2. **Negative:** Some negative tone is present in the story.

Frames are the overarching themes journalists used to structure a story. Each story was analyzed for the presence (1) or absence (0) of the following key frames identified from literature review:

1. **Scientific:** Most sources and information in the article deal with the science behind ethanol production, or research and development efforts related to ethanol.
2. **Agriculture:** Most sources and information in the article are related to the agricultural aspect of ethanol, such as farming, crops, and farmers.
3. **Industry:** Most sources and information in the article are linked with the ethanol industry, either in its production or management.
4. **Economic:** Most sources and information in the article are related to the economics of ethanol, such as prices of ethanol or corn and how it relates to the overall economic outlook for ethanol.

5. **Environmental:** Most sources and information in the article are related to the environmental or conservationist perspective on ethanol.
6. **Political:** Most sources and information in the article are related to politics through political figures, legislation, resolutions, and elections.
7. **Social:** Most sources and information in the article are concerned with the social and community aspects related to ethanol; how ethanol is affecting people and communities.
8. **Other:** Any dominant frame that does not fit into any of the above categories was identified as other and coded as a string variable.

### **Intercoder Reliability**

Three coders were trained on the study's coding protocols. Inter-coder reliability was computed using Cohen's kappa for which a reliability coefficient of 0.75 or higher is considered acceptable. In this case,

$$\text{Kappa} = \frac{\% \text{ observed agreement} - \% \text{ expected agreement}}{N \times (\text{number of coders}) - \% \text{ expected agreement}}$$

Thirteen of the 41 variables were tested, and an average of those kappa results was taken to get an overall reliability of .903, as shown in Table 1.

**Table 1. Summary of intercoder reliability tests**

<b>Variable</b>	<b>Cohen's kappa score</b>
Date of publication	1.00
Story type	.891
Story origin	1.00
Source type	1.00
Positive tone	.842
Negative tone	.803
Scientific frame	1.00

Agriculture frame	1.00
Industry frame	.776
Economic frame	.837
Environmental frame	.828
Political frame	.947
Social frame	.821
<b>Average Kappa Score</b>	<b>.903</b>

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## CHAPTER IV

### RESULTS AND DISCUSSION

This study examines the patterns of newspaper coverage of ethanol in three distinct regions in terms of intensity of coverage, the number and types of sources cited, frames used and the tone of coverage at each identified stage of the coverage cycle.

#### The Sample

Data for this study were collected through a content analysis of articles about ethanol published in three newspapers (the *Des Moines Register*, the *Houston Chronicle* and the *Fresno Bee*). Articles that discussed ethanol spanning 10 years of coverage were retrieved by searching the lead or first paragraph of stories archived in the electronic database Access World News using the search term “ethanol.” After removing duplicate articles and stories that discussed ethanol only tangentially, a total of 383 articles were gathered (133 from the *Register*; 149 from the *Chronicle*; 101 from the *Bee*). The distribution of the sample by year and newspaper is shown in Table 2.

**Table 2. Distribution of articles in the sample**

<b>Year of publication</b>	<b><i>Houston Chronicle</i></b>	<b><i>Fresno Bee</i></b>	<b><i>Des Moines Register</i></b>	<b>Total articles per year</b>
1999	2 (1.34%)	1 (1.00%)	1 (0.75%)	4 (1.0%)
2000	8 (5.30%)	0 (0.00%)	10 (7.50%)	18 (4.7%)
2001	4 (2.70%)	1 (1.00%)	4 (3.00%)	9 (2.3%)
2002	6 (4.00%)	7 (7.00%)	5 (3.75%)	18 (4.7%)
2003	11 (7.40%)	7 (7.00%)	7 (5.30%)	16 (4.2%)
2004	7 (4.70%)	7 (7.00%)	2 (1.50%)	16 (4.2%)
2005	6 (4.00%)	15 (14.8%)	10 (7.50%)	31 (8.1%)
2006	32 (21.4%)	24 (23.7%)	45 (33.8%)	101 (26.4%)
2007	34 (22.8%)	21 (20.8%)	30 (22.5%)	85 (22.2%)
2008	39 (26.2%)	18 (17.8%)	19 (14.3%)	76 (19.8%)

<b>Total</b>	<b>149</b>	<b>101</b>	<b>133</b>	<b>383</b>
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Although the sample cannot be considered large for a topic that ostensibly has national and local significance, the articles did exhibit a range of perspective on the issue. The majority of the articles were news reports, the lengths of which were about 500 to 600 words. The *Register's* stories averaged 570 words in length; the *Chronicle* had stories with an average length of 467 words; and the *Bee's* articles averaged 682 words in length.

Table 3 details the types of articles published, and shows that almost half of the ethanol stories ran in the business section (48%), while one-third of the articles ran in the news section (31%). All three newspapers had the same top-three article types in this order: business, news and opinion.

**Table 3. Number of articles by type**

<b>Article type</b>	<b><i>Des Moines Register</i></b>	<b><i>Houston Chronicle</i></b>	<b><i>Fresno Bee</i></b>	<b>Total</b>
Opinion	29 (22%)	21 (14%)	9 (9%)	59 (15%)
News	44 (33%)	44 (30%)	31 (31%)	119 (31%)
Feature	3 (2%)	3 (2%)	2 (2%)	8 (2%)
Business	47 (35%)	81 (54%)	54 (54%)	182 (48%)
Agriculture	6 (5%)	0 (0%)	5 (5%)	11 (3%)
Other	4 (3%)	0 (0%)	0 (0%)	4 (1%)

Fifteen percent of the total number of articles across newspapers can be considered opinion items, made up of letters to the editor, op-ed pieces or staff-written editorials. Opinion articles in the *Register* made up a larger percentage (22%) of the total articles than the other two papers. The *Bee's* opinion articles made up just 9 percent of

that paper's total sample, while the *Chronicle's* opinion articles comprised 14 percent. The *Register* clearly had more reader and editorial input into its ethanol coverage, which indicates the importance of the issue to the region.

Business articles, however, made up more than half of the *Chronicle's* and the *Bee's* coverage (54%), showing how those papers tended to classify the ethanol issue. Business articles consisted of 35 percent of the *Register's* articles.

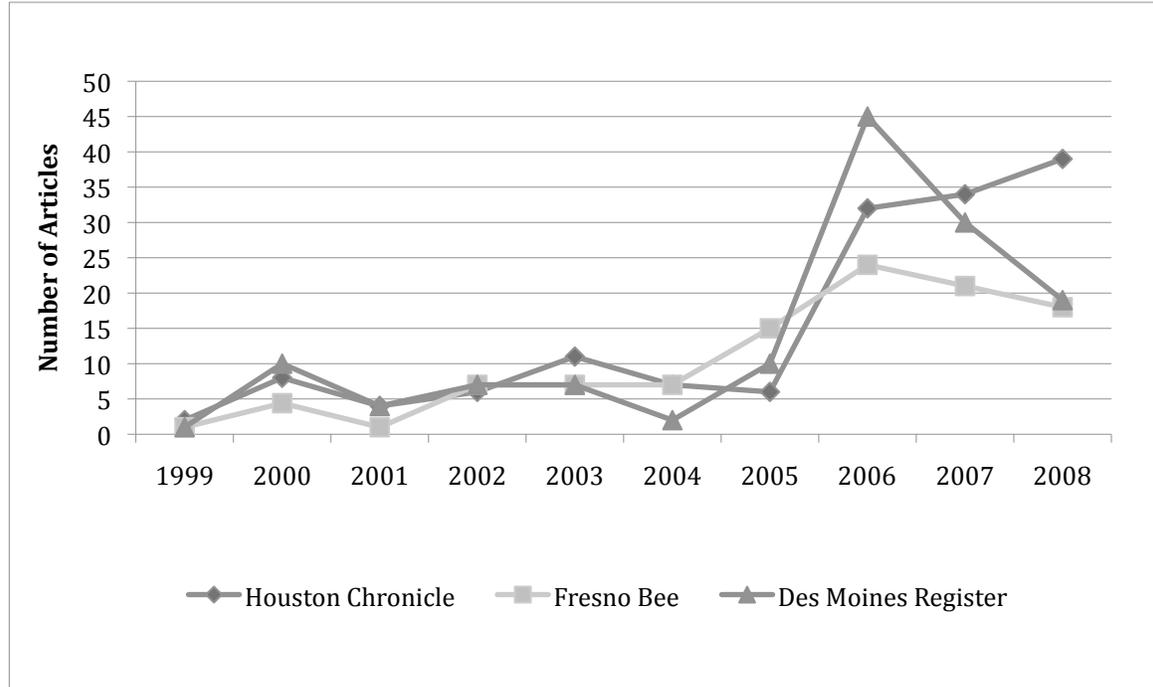
Straight news was the second most dominant category for all three newspapers. The *Chronicle* had 30 percent of its coverage as news, the *Bee* had 31 percent as news, and the *Register* had 33 percent.

### **Answering the research questions and testing the hypotheses**

#### **Cycle of coverage**

RQ1 asks: What is the pattern of newspaper coverage of ethanol from 1999 to 2008? Does it follow the hoopla effect's cycle of coverage? Does the pattern of newspaper coverage differ in Iowa compared to areas with less of a stake in the success of ethanol?

Answering these questions calls for an analysis of the amount or intensity of ethanol coverage in each of the three newspapers over time (Figure 2).

**Figure 2. Patterns of newspaper coverage of ethanol, 1999-2008**

As Figure 2 shows, there is only one discernible pre-hoopla, hoopla, and post-hoopla cycle over the ten-year period. Table 4 details the number and corresponding percentage of articles found in each hoopla phase for each of the newspapers analyzed.

**Table 4. Number of articles published during each hoopla period**

Newspaper	Pre-hoopla	Hoopla	Post-hoopla	Total
<i>Des Moines Register</i>	29 (21.8%)	85 (63.9%)	19 (14.3%)	133
<i>Houston Chronicle</i>	44 (29.5%)	105 (70.5%)	N/A	149
<i>Fresno Bee</i>	23 (22.8%)	60 (59.4%)	18 (17.8%)	101
<b>Total</b>	<b>96 (25.1%)</b>	<b>250 (65.3%)</b>	<b>37 (9.6%)</b>	<b>383</b>

As shown in Figure 2, the three newspapers followed a fairly similar pattern of coverage at pre-hoopla. They all demonstrated a dramatic spike in coverage between 2005 and 2006, marking the beginning of the hoopla period. From this point on, the three newspapers considerably differed in coverage intensity. While the *Fresno Bee's* and the

*Des Moines Register's* coverage drops off in 2006 and 2007, the *Houston Chronicle's* coverage increases well into 2008. Among the three newspapers, the *Register's* cycle is most dramatic. The *Bee's* cycle is more muted, but the three hoopla phases are definitely present. The *Chronicle* remains in the hoopla period after the other two papers have already seen a decrease in coverage characteristic of the post-hoopla period.

Figure 2 also shows little spikes in coverage that correspond with ethanol-related events. A tiny spike in the *Register's* and the *Chronicle's* coverage in 2000 corresponds with the federal government's requirement that ethanol be used to replace the gasoline additive MTBE, shown to pollute ground water. That requirement increased ethanol production in the United States and drove newspaper coverage of the topic, although the event did not get attention from the *Bee*.

A second minor spike around 2003 coincides with the 2003 energy bill debated in Congress, which called for doubling ethanol production to replace MTBE.

The large spike, which takes the newspapers into the hoopla period in 2005 and 2006, corresponds with the Energy Policy Act of 2005.

The results of a chi square test conducted to determine whether the papers differed in intensity of coverage at each hoopla phase reveals that the *Chronicle* had the highest proportion of articles in its pre-hoopla and hoopla periods compared to the other two newspapers and that this difference is statistically significant ( $X^2=27.451$ ,  $df=4$ ,  $p=.000$ ). The *Fresno Bee* had a slightly higher proportion of articles in its post-hoopla period than the *Des Moines Register*.

To ascertain whether the three papers differed in terms of the length of time covered by each hoopla period, the duration of each hoopla phase in terms of number of

months was charted (Table 5). The results show that the length of time subsumed under each phase varied as well.

**Table 5. Number of months occupied by each hoopla period**

<b>Newspaper</b>	<b>Pre-hoopla</b>	<b>Hoopla</b>	<b>Post-hoopla</b>
<i>Des Moines Register</i>	72	36	12
<i>Houston Chronicle</i>	72	48	0
<i>Fresno Bee</i>	72	36	12

Tables 4 and 5 chart the clear presence of the hoopla effect during the study period. They show consistent increases and decreases across newspapers from the beginning of the cycle in the pre-hoopla period to the close of the cycle in the post-hoopla period. Overall, the *Chronicle* produced the most number of stories during the first two stages and throughout the study timeframe, and it remained in the hoopla period one year longer than the other papers.

### **Sources**

Sources used in newspaper articles provide information about who or what organization, group or sector influenced the way an issue was covered. Sources supply journalists with information, facts and interpretations of unfolding events and topics, and thus add dimensions, spins or points of emphases into the coverage. Thus, RQ2 asks: What were the sources cited in the news reports? How do the sources cited differ among the three regions? What were the traits of sources in the three hoopla phases?

In this study, articles were coded for the number of sources cited, the organizational affiliation of each source to ascertain its type, and whether the source is local or non-local. The first five sources cited in each article were recorded. The source

types were as follows: (1) scientist (2) farmer (3) ethanol industry worker (4) oil industry worker (5) other energy industry worker (6) renewable energy association official (7) agricultural association official (8) government agency official (9) political official (10) educator (11) citizen (12) conservation/environmental non-governmental organization worker and (13) other.

Sources were also coded as local (1), not local (2) or cannot be determined (3).

Local sources are those whose places of business or operation are within the newspaper's service area. Non-local sources are those that are outside each newspaper's geographic scope.

A descriptive analysis was conducted to determine the number of sources cited and the types of sources used by each newspaper (Tables 6 and 7).

**Table 6. Number of sources cited by the three newspapers**

<b>Source type</b>	<b><i>Des Moines Register</i></b>	<b><i>Houston Chronicle</i></b>	<b><i>Fresno Bee</i></b>	<b>Total</b>
Scientist	7 (2.19%)	14 (3.92%)	6 (2.68%)	27 (3.00%)
Farmer	15 (4.70%)	9 (2.52%)	6 (2.68%)	30 (3.33%)
Ethanol industry	39 (12.2%)	35 (9.80%)	94 (41.9%)	168 (18.7%)
Oil industry	7 (2.19%)	42 (11.8%)	6 (2.68%)	55 (6.11%)
Other energy	12 (3.76%)	13 (3.64%)	8 (3.57%)	33 (3.67%)
Renewable energy	20 (6.27%)	26 (7.28%)	1 (0.45%)	47 (5.22%)
Ag assoc. official	18 (5.64%)	13 (3.64%)	9 (4.02%)	40 (4.44%)
Government official	21 (6.58%)	59 (16.5%)	30 (13.4%)	110 (12.2%)
Politician	80 (25.1%)	70 (19.6%)	20 (8.93%)	170 (18.9%)
Educator	14 (4.39%)	15 (4.20%)	7 (3.13%)	36 (4.00%)
Citizen	26 (8.15%)	15 (4.20%)	7 (3.13%)	48 (5.33%)
Environmental NGO	12 (3.76%)	9 (2.52%)	3 (1.34%)	24 (2.67%)
Other	48 (15.0%)	37 (10.4%)	27 (12.1%)	112 (12.4%)
<b>Total</b>	<b>319</b>	<b>357</b>	<b>224</b>	<b>900</b>

<b>Average number of sources cited per article</b>	<b>2.4</b>	<b>2.4</b>	<b>2.2</b>	<b>2.33</b>
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Table 6 indicates that the most frequently occurring sources were politicians, those who work in the ethanol industry, and government officials, in that order. The figures show that the *Register* and the *Chronicle* tied for the average number of sources cited per story.

These figures show distinct differences among the newspapers in terms of their use of source types. Most distinct is the *Fresno Bee's* reliance on ethanol industry workers as sources at nearly 42 percent. This newspaper used this source type more than three times as often as its two counterparts. Comparatively, the *Bee's* sourcing of politicians was far less than the other two papers' use of that source type. The *Register's* prolific use of political sources demonstrates the weighty input politicians and their aides have had on the subject in Iowa. The *Chronicle* also used political sources more than any other source type, and also relied on oil industry sources much more so than the other newspapers. The choices these papers made of whom to quote illuminate the players who are helping to shape regional coverage of the issue.

H2 posits that the diversity of sources quoted will increase as the hoopla effect runs its course. Diversity in this study is operationalized in terms of the (1) the number of sources cited and (2) the types of sources cited. To answer this hypothesis, the number of articles per newspaper in each period was determined. Then, the total number of sources per story and the total number of source types for each hoopla period were ascertained (Tables 7A-7C).

**Tables 7A-7C. Number and type of sources used across hoopla periods**

**7A. Pre-hoopla**

<b>Source type</b>	<b><i>Des Moines Register</i></b>	<b><i>Houston Chronicle</i></b>	<b><i>Fresno Bee</i></b>	<b>Total</b>
Scientist	0 (0.00%)	1 (1.15%)	1 (2.04%)	2 (0.09%)
Farmer	4 (5.06%)	1 (1.15%)	3 (6.12%)	8 (3.72%)
Ethanol industry	4 (5.06%)	3 (3.45%)	10 (20.4%)	17 (7.91%)
Oil industry	3 (3.80%)	6 (6.90%)	2 (4.08%)	11 (5.12%)
Other energy	2 (2.53%)	2 (2.30%)	0 (0.00%)	4 (1.90%)
Renewable energy	4 (5.06%)	6 (6.90%)	1 (2.04%)	11 (5.12%)
Ag association official	8 (10.1%)	1 (1.15%)	6 (12.2%)	15 (7.00%)
Government official	8 (10.1%)	22 (25.3%)	5 (10.2%)	35 (16.3%)
Politician	40 (50.6%)	33 (37.9%)	12 (24.5%)	85 (39.5%)
Educator	2 (2.53%)	2 (2.30%)	3 (6.12%)	7 (3.26%)
Citizen	1 (1.27%)	0 (0.00%)	1 (2.04%)	2 (0.09%)
Environmental NGO	0 (0.00%)	4 (4.60%)	1 (2.04%)	5 (2.33%)
Other	3 (3.80%)	6 (6.90%)	4 (8.16%)	13 (6.05%)
<b>Total no. of sources cited</b>	<b>79</b>	<b>87</b>	<b>49</b>	<b>215</b>
<b>Total no. of source types used</b>	<b>11</b>	<b>12</b>	<b>12</b>	<b>35</b>

**7B. Hoopla**

<b>Source type</b>	<b><i>Des Moines Register</i></b>	<b><i>Houston Chronicle</i></b>	<b><i>Fresno Bee</i></b>	<b>Total</b>
Scientist	7 (3.43%)	13 (4.85%)	4 (3.13%)	24 (4.00%)
Farmer	10 (4.90%)	8 (2.99%)	3 (2.34%)	21 (3.50%)
Ethanol industry	32 (15.7%)	32 (11.9%)	63 (49.2%)	127 (21.2%)
Oil industry	3 (1.50%)	36 (13.4%)	2 (1.56%)	41 (6.83%)
Other energy	7 (3.43%)	11 (4.10%)	5 (3.90%)	23 (3.83%)
Renewable energy	15 (7.35%)	20 (7.46%)	0 (0.00%)	35 (5.83%)
Ag association official	8 (3.92%)	10 (3.73%)	3 (2.34%)	21 (3.50%)
Government official	13 (6.37%)	37 (13.8%)	13 (10.2%)	63 (10.5%)
Politician	43 (21.1%)	37 (13.8%)	7 (5.47%)	87 (14.5%)
Educator	7 (3.43%)	13 (4.85%)	4 (3.13%)	24 (4.00%)

Citizen	19 (9.31%)	15 (5.60%)	3 (2.34%)	37 (6.17%)
Environmental NGO	7 (3.43%)	5 (1.87%)	0 (0.00%)	12 (2.00%)
Other	33 (16.2%)	31 (11.6%)	21 (16.4%)	85 (14.2%)
<b>Total no. of sources cited</b>	<b>204</b>	<b>268</b>	<b>128</b>	<b>600</b>
<b>Total no. of source types used</b>	<b>13</b>	<b>13</b>	<b>11</b>	<b>37</b>

### 7C. Post-hoopla

<b>Source</b>	<b><i>Des Moines Register</i></b>	<b><i>Fresno Bee</i></b>	<b>Total</b>
Scientist	0 (0.00%)	1 (2.70%)	1 (1.27%)
Farmer	1 (2.38%)	0 (0.00%)	1 (1.27%)
Ethanol industry	3 (7.14%)	21 (56.8%)	24 (30.4%)
Oil industry	1 (2.38%)	2 (5.41%)	3 (3.80%)
Other energy	1 (2.38%)	1 (2.70%)	2 (2.53%)
Renewable energy	1 (2.38%)	0 (0.00%)	1 (1.27%)
Ag association official	2 (4.76%)	0 (0.00%)	2 (2.53%)
Government official	0 (0.00%)	5 (13.5%)	5 (6.33%)
Politician	7 (16.7%)	1 (2.70%)	8 (10.1%)
Educator	5 (11.9%)	0 (0.00%)	5 (6.33%)
Citizen	4 (9.52%)	3 (8.11%)	7 (8.87%)
Environmental NGO	5 (11.9%)	1 (2.70%)	6 (7.60%)
Other	12 (28.6%)	2 (5.41%)	14 (17.7%)
<b>Total number of sources cited</b>	<b>42</b>	<b>37</b>	<b>79</b>
<b>Total number of source types used</b>	<b>11</b>	<b>12</b>	<b>23</b>

The preceding tables show a sharp increase in the total number of sources across the newspapers during the hoopla phase, a finding that supports the theoretical prediction. From 79 sources at pre-hoopla, the *Register* used 204 at hoopla. The number then decreased to 42 at post-hoopla, as predicted. The *Bee* cited 49 sources at pre-hoopla, a number that increased to 128 at hoopla and went down to 37 at post-hoopla. The *Chronicle* also showed the same pattern, with 87 sources at pre-hoopla and 268 at hoopla.

Thus, the preceding tables provide support to the contention that there will be more sources cited during the hoopla phase.

Yet, this finding does not take into account that an increase in stories during the hoopla period would result in an increase in sources during that period. To obtain a better picture of the use of sources over time, the average number of sources for each hoopla period was charted. The results are shown in Table 8.

**Table 8. Average number of sources per story in each hoopla period**

<b>Period</b>	<b><i>Des Moines Register</i></b>	<b><i>Houston Chronicle</i></b>	<b><i>Fresno Bee</i></b>	<b>Total</b>
Pre-hoopla	2.7	2.0	2.1	<b>2.3</b>
Hoopla	2.4	2.6	2.1	<b>2.4</b>
Post-hoopla	2.2	N/A	2.1	<b>2.15</b>
<b>Total</b>	<b>2.4</b>	<b>2.4</b>	<b>2.1</b>	<b>2.3</b>

**Table 9. Summary of one-way ANOVA tests for sources cited across time**

<b>Newspaper</b>	<b>Sum of squares</b>	<b>df</b>	<b>Mean square</b>	<b>F</b>	<b>p</b>	
<b><i>Register</i></b>						
Between groups	.975	2	.488	.196	.823	
Within groups	174.508	130	1.342			
Total	185.203	132				
Scheffe post-hoc						
		<b>Mean Difference</b>	<b>Std. Error</b>	<b>Sig.</b>	<b>Lower Bound</b>	<b>Upper Bound</b>
Pre-hoopla	Hoopla	.20892	.33953	.828	-.6318	1.0497
	Post-hoopla	.19964	.46599	.912	-.9543	1.3535
Hoopla	Pre-hoopla	-.20892	.33953	.828	-1.0497	.6318
	Post-hoopla	-.00929	.40065	1.000	-1.0014	.9828
Post-hoopla	Pre-hoopla	-.19964	.46599	.912	-1.3535	.9543
	Hoopla	.00929	.40065	1.000	-.9828	1.0014
<b><i>Chronicle</i></b>						
<b>Newspaper</b>	<b>Sum of squares</b>	<b>df</b>	<b>Mean square</b>	<b>F</b>	<b>p</b>	

<b>Between groups</b>	<b>13.363</b>	<b>1</b>	<b>13.363</b>	<b>4.786</b>	<b>.030</b>	
Within groups	410.489	147	2.792			
Total	423.852	148				
<hr/>						
<b><i>Bee</i></b>	<b>Sum of squares</b>	<b>df</b>	<b>Mean square</b>	<b>F</b>	<b>p</b>	
<hr/>						
Between groups	1.793	2	.896	.357	.701	
Within groups	246.247	98	2.513			
Total	248.040	100				
<hr/>						
Scheffe post-hoc						
		<b>Mean difference</b>	<b>Std. error</b>	<b>Sig.</b>	<b>Lower Bound</b>	<b>Upper Bound</b>
Pre-hoopla	Hoopla	.28478	.38875	.765	-.6815	1.2511
	Post-hoopla	.37923	.49884	.750	-.8607	1.6192
Hoopla	Pre-hoopla	-.28478	.38875	.765	-1.2511	.6815
	Post-hoopla	.09444	.42600	.976	-.9644	1.1533
Post-hoopla	Pre-hoopla	1.37923	.49884	.750	-1.6192	.8607
	Hoopla	-.09444	.42600	.976	-1.1533	.9644

As Table 8 shows, across newspapers and across hoopla phases, the average number of citations per story remained a little more than two sources per article. The figures indicate that the average number of sources per story increased during the hoopla period only in the case of the *Chronicle*. The *Register* reduced its use of sources per story with each period; the *Bee's* figures were constant throughout the entire cycle. Therefore, this aspect of the analysis did not support the contention that stories during the hoopla phase will feature more sources.

Table 9 shows results of three ANOVA tests that show only significant ( $p < .05$ ) difference in the *Chronicle's* use of sources over time. The other two newspapers did not have statistically significant differences of source use during the study timeframe.

Did the number of source types increase over the cycle? According to the figures in Tables 7A-7C, overall, the three papers cited 35 source types at pre-hoopla, 37 at

hoopla, and 23 at post-hoopla, a finding that goes with the theoretical prediction. However, an examination of each of the newspapers shows no discernible pattern in terms of the total number of source types used across the coverage cycle. There were 11 source types cited by the *Register* at pre-hoopla, 13 at hoopla, and 11 at post-hoopla. The number of source types for the *Chronicle* also increased by one at hoopla. The *Bee*'s figures, however, declined by one at hoopla. These findings suggest only partial support for the hypothesis that the number of source types used will increase as the cycle moves to the hoopla phase.

The three papers, however, showed some similarities in their use of source types across the cycle phases based on the figures in Tables 7A-7C. Table 10 summarizes the most frequent types of sources used in each newspaper during each hoopla period. In the pre-hoopla phase, the three newspapers relied predominantly on political sources and government agency sources. During the hoopla period, ethanol industry, political and "other" sources were most heavily quoted. In the post-hoopla period, ethanol industry, politicians, government officials and "other" are among the most dominant source types, but there is an increase in the presence of environmental NGO sources, citizens and educators.

However, there are also clear distinctions among the newspapers. Throughout the three hoopla periods, the *Bee*, whose coverage revolved around the local ethanol company, most often quoted ethanol industry workers, and the use of this source increased across the board. Clearly, the *Bee* made more use of this source type than the other two newspapers. Ethanol industry workers had the greatest presence in the post-hoopla period, but were strong in the preceding periods as well. In fact, its reliance on

this source type increased as time went on. The *Register's* coverage had the greatest diversity of sources across hoopla periods, but relied most heavily on political sources. The *Register* used politicians the most throughout the three hoopla periods, although the percentage of citations declined with time. The *Chronicle*, which covers a region with strong oil interests, used oil industry sources more frequently than the other two papers. The *Chronicle's* reliance on political sources also declined across time, but its use of oil industry sources increased.

**Table 10. Top three source types used across hoopla periods**

<b>Newspaper</b>	<b>Pre-hoopla</b>	<b>Hoopla</b>	<b>Post-hoopla</b>
<i>Des Moines Register</i>	1. Politician 2. Gov't official/ Ag assn. (tie) 3. Ethanol industry/ Farmer (tie)	1. Politician 2. Other 3. Ethanol industry	1. Other 2. Politician 3. Environmental NGO/ Educator (tie)
<i>Houston Chronicle</i>	1. Politician 2. Gov't official 3. Oil industry/ Renewable energy (tie)	1. Politician/Gov't official (tie) 2. Oil industry 3. Ethanol industry	N/A
<i>Fresno Bee</i>	1. Politician 2. Ethanol industry 3. Ag association	1. Ethanol industry 2. Other 3. Gov't Official	1. Ethanol industry 2. Other 3. Politician

Tables 11A-11C show the rank ordering of source types used by the three newspapers for each hoopla period, and the results of the rank order correlation tests to determine how similar the newspapers were in terms of source rankings.

**Table 11A. Rank order of source types in the pre-hoopla period**

<b>Source Type</b>	<b><i>Des Moines Register</i></b>	<b><i>Houston Chronicle</i></b>	<b><i>Fresno Bee</i></b>
Scientist	12.5	11	10.5

Farmer	5	11	6.5
Ethanol industry	5	7	2
Oil industry	7.5	4	8
Other energy	8.5	8.5	13
Renewable energy	5	4	10.5
Ag association	2.5	11	3
Government official	2.5	2	4
Politician	1	1	1
Educator	8.5	8.5	6.5
Citizen	11	13	10.5
Environmental NGO	12.5	6	10.5
Other	7.5	4	5

Rank order correlation: *Register vs Chronicle*:  $r_s=0.530$ ;  $p=.063$ ; not significant

Rank order correlation: ***Register vs Bee***:  $r_s=0.749$ ;  $p=.003$ ; significant

Rank order correlation: *Chronicle vs Bee*:  $r_s=0.369$ ;  $p=.215$ ; not significant

**Table 11B. Rank order of source types in the hoopla period**

Source Type	<i>Des Moines Register</i>	<i>Houston Chronicle</i>	<i>Fresno Bee</i>
Scientist	10.5	8.5	6.5
Farmer	7	12	9
Ethanol industry	3	4	1
Oil industry	13	3	11
Other energy	10.5	10	5
Renewable energy	5	6	12.5
Ag association	8	11	9
Government official	6	1.5	3
Politician	1	1.5	4
Educator	10.5	8.5	6.5
Citizen	4	7	9
Environmental NGO	10.5	13	12.5

Other 2 5 2

Rank order correlation: *Register* vs *Chronicle*:  $r_s=.481$ ;  $p=.103$ ; not significant

Rank order correlation: *Register* vs *Bee*:  $r_s=.490$ ;  $p=.080$ ; not significant

Rank order correlation: *Chronicle* vs *Bee*:  $r_s=.492$ ;  $p=.088$ ; not significant

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**Table 11C. Rank order of source types in the post-hoopla period**

Source Type	<i>Des Moines Register</i>	<i>Fresno Bee</i>
Scientist	12.5	7.5
Farmer	9.5	11.5
Ethanol industry	6	1
Oil industry	9.5	4.5
Other energy	9.5	7.5
Renewable energy	9.5	11.5
Ag association	7	11.5
Government official	12.5	2
Politician	2	7.5
Educator	3.5	11.5
Citizen	5	3
Environmental NGO	3.5	7.5
Other	1	4.5

Rank order correlation: *Register* vs *Bee*:  $r_s=.010$ ;  $p=.974$ ; not significant

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The results of the rank order correlation tests support the finding that there is no discernible pattern in terms of source types used across the three newspapers. During the pre-hoopla period, the *Register* and the *Chronicle* did not exhibit significantly similar rank ordering of source types. This is the same between the *Chronicle* and the *Bee*. At this phase, only the *Register* and the *Bee* showed significant correlation in their rank ordering ( $r_s=0.749$ ;  $p=.003$ ). At hoopla, no newspaper pair showed the same rank

ordering of source types as well. The same is true for the single pair that can be analyzed at post-hoopla, the *Register* and the *Bee*. The results show that the newspapers exhibited enough variation in their use of source types and suggest that local context is influencing the nature of coverage.

The comparison between the pre-hoopla *Register* and *Bee* coverage illustrates their similarity of source use during that period, which points to similarities in sources that drove coverage early on. Iowa's economy stood to benefit from increased ethanol production, and Fresno's local ethanol industry also would have received a boost from increased ethanol production. Both newspapers relied most on politicians who were instrumental in garnering support for ethanol as a replacement for MTBE. Ethanol industry, government, agricultural associations, farmer and educator sources were also frequently used in both newspapers. The two papers also had a strong showing of sources in the "other" category.

In order to fully answer H2, the "other" source type category must be examined because it ranked high in frequency of use in two of the three hoopla periods. Sources that did not fit into any category were coded as "other." Table 12 shows the number of occurrences for each "other" source type. There were 24 categories that included 111 instances of named "other" sources. Of these, those in finance, the media, and the automobile industry were the most frequently cited, in that order. Attributions to those who belong to 11 "other" categories were observed only once per category.

**Table 12. Most frequent "other" sources cited**

Type of source	Number of occurrences
Finance	23
Media	19

Auto industry	16
Agribusiness	9
Analyst (not specified)	7
Economist	6
Real estate	5
Trade association	5
Healthcare	3
Race car driver	3
Job advocate	2
Think tank	2
Lawyer	1
Design firm	1
Business development	1
Grocery store	1
Labor union	1
Commodity analyst	1
Speaker	1
Philanthropist	1
Transportation	1
United Nations	1
Steel worker	1
<b>Total</b>	<b>111</b>

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While Table 12 breaks down the occurrences of “other” source types, Tables 13A-13C show which of these “other” types fall into specific hoopla periods for specific newspapers. These tables suggest relatively low figures for total source types, total number of actual source types cited, and number of unique source types at pre-hoopla. These three indicators, however, uniformly rose during the hoopla period, and declined at

post-hoopla. At this final stage, the numbers for the *Bee* were consistently lower than those at the pre-hoopla phase.

**Table 13A. Other source types used in each hoopla period in the *Des Moines Register***

Type of source	Pre-hoopla	Hoopla	Post-hoopla
Agribusiness	1	2	0
Analyst	0	1	0
Auto industry	0	4	0
Car racer	0	1	2
Commodity analyst	0	1	0
Economist	0	0	4
Finance	0	7	1
Labor union	0	1	0
Lawyer	0	1	0
Media	1	10	2
Philanthropist	0	1	0
Real estate	0	0	2
Speaker	0	1	0
Think tank	0	0	1
Trade association	0	2	0
Transportation	1	0	0
<b>Total source types</b>	<b>3</b>	<b>14</b>	<b>6</b>
<b>Total sources</b>	<b>3</b>	<b>34</b>	<b>12</b>
<b>Unique source types</b>	<b>1</b>	<b>10</b>	<b>3</b>

**Table 13B. Other source types used in each hoopla period in the *Houston Chronicle***

Type of source	Pre-hoopla	Hoopla
Agribusiness	0	1
Analyst	0	2
Auto industry	1	11

Economist	0	1
Finance	1	8
Grocery store	0	1
Healthcare	3	0
Media	0	3
Trade association	0	3
<b>Total source types</b>	<b>3</b>	<b>8</b>
<b>Total sources</b>	<b>5</b>	<b>30</b>
<b>Unique source types</b>	<b>1</b>	<b>6</b>

**Table 13C. Other source types used in each hoopla period in the *Fresno Bee***

Type of source	Pre-hoopla	Hoopla	Post-hoopla
Agribusiness	0	5	0
Analyst	0	4	0
Business development	0	1	0
Design firm	1	0	0
Economist	0	1	0
Finance	0	5	1
Job advocate	0	2	0
Media	2	0	1
Real estate	0	3	0
Steel worker	1	0	0
<b>Total source types</b>	<b>3</b>	<b>7</b>	<b>2</b>
<b>Total sources</b>	<b>4</b>	<b>21</b>	<b>2</b>
<b>Unique source types</b>	<b>2</b>	<b>7</b>	<b>1</b>

Table 14 provides the total number of source types, including those in the “other” category, used across the hoopla periods for each newspaper. Here, the figures show a pattern of source type use consistent with the hypothesized direction. That is, there were

considerably more source types evident at hoopla compared to the pre- and post-hoopla stages.

**Table 14. Number of source types (including “other” types) across hoopla periods**

<b>Newspaper</b>	<b>Pre-hoopla</b>	<b>Hoopla</b>	<b>Post-hoopla</b>
<i>Des Moines Register</i>	13	26	16
<i>Houston Chronicle</i>	14	20	N/A
<i>Fresno Bee</i>	14	17	13

The combined data shown in Tables 12, 13A-13C and 14 indicate a significant increase in the diversity of source types used during the hoopla period in all three newspapers. That number drops off during the post-hoopla period for the *Register* and the *Bee*.

H1 posits that across newspapers, scientists and other sources with a positive stake in ethanol will be heavily quoted in the beginning of the coverage cycle, while opponents and critics of ethanol would be quoted in the middle and latter stages of the coverage cycle. Based on the breakdown of number of sources used and the types of sources shown in Tables 7A-7C and Table 10, sources that have a positive stake in ethanol were indeed heavily quoted in the pre-hoopla period. These included politicians, government officials, ethanol industry workers, agricultural associations and renewable energy associations who want to please their constituents and spur economic development to their region. Scientists were not quoted during the pre-hoopla period, which suggests that science was not a particularly important aspect of the ethanol coverage.

In the pre-hoopla and hoopla periods, politicians, government officials, ethanol industry workers, oil industry workers and citizens were the dominant sources. Contrary

to the findings of previous studies, it is only at the hoopla period when more scientists enter the picture, with many discussing research and development efforts toward the creation of “second-generation ethanol,” this time made from other biomass sources such as switchgrass and sugarcane. During the post-hoopla period, the number of citations predictably dropped, but there continued to be representation from many source types. However, politicians did not appear to have such a dominant role at this juncture. Instead, the more critical views of environmental non-government organizations and educators began to be heard more frequently. The environmental NGOs, in particular, have been quite critical of ethanol’s effect on air and water quality.

The *Bee*’s coverage during this period continued to heavily source members of the ethanol industry and government officials. The *Bee*’s case is peculiar in itself because a large proportion of its coverage centered on the regional ethanol business run by Pacific Ethanol. Many industry sources represented in the *Bee*’s coverage came from Pacific Ethanol or its business collaborators.

These findings indicate that H1 is partially supported. While there were virtually no scientists quoted in the beginning of the coverage cycle, the *Register* followed the prediction that those with a positive stake on ethanol would be sourced early, after which there will be an increase in more critical voices, such as environmental NGOs. The *Bee*’s coverage mainly played up the views of ethanol industry workers (who have a positive interest in ethanol) throughout the coverage period, The *Chronicle*’s coverage relied mostly on politicians, government officials, oil and ethanol industry workers throughout the coverage cycle. But because the papers had a relatively large number of renewable energy sources with a positive stake in ethanol quoted in the pre-hoopla period, it appears

as if there was a preponderance of sources positively disposed toward ethanol. Also, because the *Chronicle* was yet to enter the post-hoopla period at the end of the study's timeframe, it is uncertain if that newspaper's final coverage phase would have included more critical voices.

H2 is also partially supported. Table 14 tracks the diversity of sources over the course of the study period and shows that the *Register* and the *Bee* both increased their source diversity during the hoopla period, but this declined during the post-hoopla period. In these two newspapers, there was not a steady increase of source diversity throughout the three periods. Although the trajectory of source type is incomplete for the *Chronicle*, the paper still registered an increase in source diversity during the hoopla period.

### **Frames**

Frames, a story's overall thematic framework, can act as filtering devices to aid reporters in interpreting and presenting a story. By sheer accident or by design, frames can be thrust upon a reporter by sources, and reporters can consciously or subconsciously employ these frames in shaping how audiences would come to understand a topic or issue. In any case, a frame gives the reader some perspective on a topic. The way an issue is framed can have an effect on the reader's perception of that issue. Thus, RQ3 asks: What are the most common frames associated with ethanol? Do they differ among the compared regions?

To answer these questions, the seven key frames used to tell the story of ethanol were identified and used as dummy variables. These were: (1) scientific; (2) agricultural; (3) industry; (4) economic; (5) environmental; (6) political; (7) social; and (8) "other" frames. The presence (1) or absence (0) of these frames within a story was coded. The

most frequently occurring frames at each stage of the coverage cycle are listed in Table 15.

**Table 15. Top three frames observed in each hoopla period for each newspaper**

<b>Newspaper</b>	<b>Pre-hoopla</b>	<b>Hoopla</b>	<b>Post-hoopla</b>
<i>Des Moines Register</i>	1. Politics 2. Environment 3. Industry	1. Industry 2. Economics 3. Politics	1. Economics 2. Politics 3. Industry
<i>Houston Chronicle</i>	1. Politics 2. Other (MTBE) 3. Environment	1. Industry 2. Economics 3. Politics	N/A
<i>Fresno Bee</i>	1. Industry 2. Environment 3. Other (MTBE)	1. Industry 2. Economics 3. Agriculture	1. Industry 2. Economics 3. Social

The two most common “other” frames were ethanol as a replacement for MTBE (42 occurrences), and reducing the country’s dependence on foreign oil (17 occurrences).

Table 16 details the breakdown of how frames were used by each newspaper during each hoopla period. The table indicates that across newspapers, the predominantly applied frames were industry, economic and political frames, in that order. Of the frames listed, the social and “other” frames were used less frequently, but the science frame was the least employed.

**Table 16. Frame use among the three newspapers**

<b>Frame</b>	<b><i>Des Moines Register</i></b>	<b><i>Houston Chronicle</i></b>	<b><i>Fresno Bee</i></b>	<b>Total</b>
Science	20 (5.9%)	21 (6%)	9 (3.4%)	50 (5.3%)
Agriculture	42 (12.5%)	33 (9.4%)	28 (10.7%)	103 (10.8%)
Industry	74 (22%)	63 (17.9%)	80 (30.5%)	217 (22.8%)
Economic	58 (17.2%)	61 (17.4%)	51 (19.5%)	170 (17.9%)
Environmental	36 (10.7%)	33 (9.4%)	32 (12.2%)	101 (10.6%)
Politics	68 (20.2%)	69 (19.7%)	25 (9.5%)	162 (17.1%)

Social	24 (7.1%)	36 (10.3%)	14 (5.3%)	74 (7.8%)
Other	15 (4.5%)	35 (10%)	23 (8.8%)	73 (7.7%)
<b>Average no. of frames per story</b>	<b>2.5</b>	<b>2.35</b>	<b>2.6</b>	<b>2.48</b>

Is there a pattern of frame use across the hoopla periods? H3 posits that for all newspapers, the number of news frames present in the coverage will decrease in the middle and latter stages of the cycle as suggested in the literature. It was therefore necessary to count the number of frames present in each story appearing at each hoopla phase. The average number of frames detected in stories that fall under each hoopla phase are listed in Tables 17A-17C.

**Table 17A. Frame use among the three newspapers in the pre-hoopla period**

<b>Frame</b>	<b><i>Des Moines Register</i></b>	<b><i>Houston Chronicle</i></b>	<b><i>Fresno Bee</i></b>	<b>Total</b>
Science	1 (1.4%)	4 (3.3%)	3 (4.1%)	8 (3%)
Agriculture	7 (9.6%)	5 (4.2%)	10 (13.7%)	22 (8.3%)
Industry	10 (13.7%)	12 (10%)	14 (19.2%)	36 (13.5%)
Economic	15 (20.5%)	29 (24.2%)	7 (9.6%)	51 (19.2%)
Environmental	11 (15.1%)	17 (14.2%)	13 (17.8%)	41 (15.4%)
Politics	21 (28.8%)	24 (20%)	9 (12.3%)	54 (20.3%)
Social	3 (4.1%)	8 (6.7%)	5 (6.8%)	16 (6%)
Other	5 (6.8%)	21 (17.5)	12 (16.4%)	38 (14.3%)
<b>Total frames used</b>	<b>73 (27.4%)</b>	<b>120 (45.1%)</b>	<b>73 (27.4%)</b>	<b>266</b>
<b>Average number of frames per story</b>	<b>2.5</b>	<b>2.7</b>	<b>3.2</b>	<b>2.8</b>

**Table 17B. Frame use among the three newspapers in the hoopla period**

<b>Frame</b>	<b><i>Des Moines Register</i></b>	<b><i>Houston Chronicle</i></b>	<b><i>Fresno Bee</i></b>	<b>Total</b>
Science	18 (8.5%)	17 (6.9%)	5 (3.2%)	30 (5%)

Agriculture	28 (13.2%)	28 (11.4%)	18 (11.7%)	74 (12.3%)
Industry	54 (25.5%)	51 (20.8%)	49 (31.8%)	154 (25.6%)
Economic	39 (18.4%)	46 (18.8%)	34 (22.1%)	119 (33.1%)
Environmental	17 (8%)	16 (6.5%)	16 (10.4%)	49 (8.2%)
Politics	36 (17%)	45 (18.4%)	16 (10.4%)	97 (16.1%)
Social	12 (5.7%)	28 (11.4%)	5 (3.2%)	45 (7.5%)
Other	8 (8.8%)	14 (5.7%)	1 1 (7.1%)	33 (5.5%)
<b>Total frames used</b>	<b>212 (35.3%)</b>	<b>245 (40.8%)</b>	<b>154 (25.6%)</b>	<b>601</b>
<b>Average number of frames per story</b>	<b>2.5</b>	<b>2.33</b>	<b>2.56</b>	<b>2.46</b>

**Table 17C. Frame use among the three newspapers in the post-hoopla period**

<b>Frame</b>	<b><i>Des Moines Register</i></b>	<b><i>Fresno Bee</i></b>	<b>Total</b>
Science	1 (1.6%)	1 (2.9%)	2 (2.1%)
Agriculture	7 (11.5%)	0 (0%)	7 (7.3%)
Industry	10 (16.4%)	17 (48.6%)	27 (28.1%)
Economic	13 (21.3%)	10 (28.6%)	23 (24%)
Environmental	8 (13.1%)	3 (8.6%)	11 (11.5%)
Politics	11 (18%)	0 (0%)	11 (11.5%)
Social	9 (14.8%)	4 (11.4%)	13 (13.5%)
Other	2 (3.3%)	0 (0%)	2 (2.1%)
<b>Total frames used</b>	<b>61 (63.5%)</b>	<b>35 (36.5%)</b>	<b>96</b>
<b>Average number of frames per story</b>	<b>3.2</b>	<b>1.9</b>	<b>2.55</b>

The tables show that in terms of total number of frames used, the three newspapers employed considerably more frames at the hoopla phase, and that these figures dropped below pre-hoopla numbers at the post-hoopla stage. The picture is different, however, when one examines the average number of frames applied per story. As Tables 17A-17C show, the *Register* had the same average number of frames per story

at pre-hoopla and at hoopla stages (2.5). Contrary to theoretical prediction, average frame used increased to 3.2 at post-hoopla. The *Chronicle* and the *Bee* demonstrated a decline in average frames used from pre-hoopla to hoopla. The *Bee* carried this downward trend up to the post-hoopla phase (from 2.56 to 1.9) as predicted by Miller and Riechert (2003) in their four-stage framing cycle. Thus, the model gets only partial support in the case of the *Bee*.

To determine whether the three papers differed in terms of frame use, a series of rank order correlation tests were conducted for each stage of the coverage cycle. The rank ordering of frames and the results of these tests are shown in Tables 18A-18C.

**Table 18A. Rank order correlation of frames used in the pre-hoopla period**

Frame	<i>Des Moines Register</i>	<i>Houston Chronicle</i>	<i>Fresno Bee</i>
Science	8	8	8
Agriculture	5	7	4
Industry	4	5	1
Economic	2	1	6
Environmental	3	4	2
Politics	1	2	5
Social	7	6	7
Other	6	3	3

Rank order correlation: *Register vs Chronicle*:  $r_s = .786$ ;  $p = .021$ ; significant

Rank order correlation: *Register vs Bee*:  $r_s = .393$ ;  $p = .352$ ; not significant

Rank order correlation: *Chronicle vs Bee*:  $r_s = .238$ ;  $p = .570$ ; not significant

**Table 18B. Rank order correlation of frames used in the hoopla period**

Frame	<i>Des Moines Register</i>	<i>Houston Chronicle</i>	<i>Fresno Bee</i>
Science	5	6	7.5
Agriculture	4	4.5	3
Industry	1	1	1
Economic	2	2	2
Environmental	6	7	4.5
Politics	3	3	4.5
Social	7	4.5	7.5
Other	8	8	6

Rank order correlation: *Register vs Chronicle*:  $r_s=.898$ ;  $p=.002$ ; significant  
 Rank order correlation: *Register vs Bee*:  $r_s=.807$ ;  $p=.015$ ; significant  
 Rank order correlation: *Chronicle vs Bee*:  $r_s=.685$ ;  $p=.061$ ; not significant

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**Table 18C. Rank order correlation of frames used in the post-hoopla period**

Frame	<i>Des Moines Register</i>	<i>Fresno Bee</i>
Science	8	5
Agriculture	6	7
Industry	3	1
Economic	1	2
Environmental	5	4
Politics	2	7
Social	4	3
Other	7	7

Rank order correlation: *Register vs Bee*:  $r_s=.488$ ;  $p=.220$ ; not significant

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RQ3 asks for the most common frames employed and if there are differences among the newspapers in terms of the most dominant frames used as depicted in the rank ordering of frames based on frequency of use. The results of the rank order correlation tests shown in Tables 18A-18C indicate enough variation among the three newspapers in terms of frame use so that a distinct pattern cannot be spotted. At pre-hoopla, the *Chronicle* and the *Bee* did not indicate the same rank ordering of frames; nor did the *Register* and the *Bee*. The *Register-Chronicle* pair showed a statistically significant correlation, which indicates resonance in frame rank order. At the hoopla stage, the *Chronicle* and the *Bee* did not display similar rank ordering, but the *Register* and the *Chronicle* and the *Register* and *Bee* did. At post hoopla, the only pair analyzed, the *Register* vs. the *Bee*, indicated no difference in rank ordering of frames. Again, these findings suggest the potential impact of local context on frame use.

The *Bee* used the industry frame most often across hoopla periods due to its focus on the local ethanol industry in Fresno. Early frames for the *Bee*, the *Chronicle*, and the *Register* included environmental and “other” frames (specifically ethanol as a replacement for MTBE). Interestingly, the *Bee* did not use political frames as much as its two counterparts in any of the hoopla periods. To the *Bee*, the ethanol issue was less a political issue as it was a local industry and economic issue.

The politics frame appeared in the top-three frames for the *Register* and the *Chronicle* throughout the study period. During the pre-hoopla period, politicians and government officials were key players in garnering support for ethanol as a replacement for MTBE. At that time, the debate was taking place in earnest at the federal, state and local levels. In Iowa, local and federal politicians were eager to get financial and political support for corn-based ethanol to replace MTBE. Stories in the *Chronicle* during this period mostly came from non-staff writers, and did not evaluate the local political impact of ethanol.

The other top frames in the pre-hoopla period—environment, industry and “other”—show how the discussion transpired during this time. Fuel is often an environmental issue, and ethanol during the pre-hoopla period was mainly touted as an environment-friendly MTBE alternative. Ethanol at this stage was couched as a way to reduce tailpipe emissions and replace a known groundwater pollutant. That MTBE also carries a political dimension explains the presence of the industry frame because industry workers were the ones explaining the semantics of ethanol production to different audience segments.

To determine if there is a difference among the newspapers in terms of the average number of frames used at each hoopla stage, a series of one-way ANOVA tests were conducted. The results, shown in Table 19, show that in this regard, the three newspapers were significantly different ( $p < .05$ ). Specifically, significant differences across phases were detected for the *Register* and the *Bee*.

**Table 19. Summary of one-way ANOVA tests for frames used**

<b>Newspaper</b>	<b>Sum of squares</b>	<b>df</b>	<b>Mean square</b>	<b>F</b>	<b>p</b>	
<b><i>Register</i></b>						
<b>Between groups</b>	<b>10.695</b>	<b>2</b>	<b>5.347</b>	<b>3.983</b>	<b>.021</b>	
Within groups	174.508	130	1.342			
Total	185.203	132				
Scheffe post-hoc						
		<b>Mean Difference</b>	<b>Std. Error</b>	<b>Sig.</b>	<b>Lower Bound</b>	<b>Upper Bound</b>
Pre-hoopla	Hoopla	-.27546	.24916	.554	-.8924	.3415
	Post-hoopla	<b>-.95100</b>	<b>.34196</b>	<b>.023</b>	<b>-1.7978</b>	<b>-.1042</b>
Hoopla	Pre-hoopla	.27546	.24916	.554	-.3415	.8924
	Post-hoopla	-.67554	.29401	.075	-1.4036	.0525
Post-hoopla	Pre-hoopla	<b>.95100</b>	<b>.34196</b>	<b>.023</b>	<b>.1042</b>	<b>1.7978</b>
	Hoopla	.67554	.29401	.075	-.0525	1.4036
<hr/>						
<b><i>Chronicle</i></b>						
	<b>Sum of squares</b>	<b>df</b>	<b>Mean square</b>	<b>F</b>	<b>p</b>	
Between groups	.548	1	.548	.458	.499	
Within groups	175.627	147	1.195			
Total	176.174	148				
<hr/>						
<b><i>Bee</i></b>						
	<b>Sum of squares</b>	<b>df</b>	<b>Mean square</b>	<b>F</b>	<b>p</b>	
<b>Between groups</b>	<b>13.211</b>	<b>2</b>	<b>6.606</b>	<b>3.645</b>	<b>.030</b>	
Within groups	177.621	98	1.812			
Total	190.832	100				
Scheffe post-hoc						
		<b>Mean difference</b>	<b>Std. error</b>	<b>Sig.</b>	<b>Lower Bound</b>	<b>Upper Bound</b>

Pre-hoopla	Hoopla	.53696	.33017	.271	-.2837	1.3576
	<b>Post-hoopla</b>	<b>1.14251</b>	<b>.42367</b>	<b>.030</b>	<b>.0894</b>	<b>2.1956</b>
Hoopla	Pre-hoopla	-.53696	.33017	.271	-1.3576	.2837
	Post-hoopla	.60556	.36180	.251	-.2937	1.5049
<b>Post-hoopla</b>	<b>Pre-hoopla</b>	<b>-1.14251</b>	<b>.42367</b>	<b>.030</b>	<b>-2.1956</b>	<b>-.0894</b>
	Hoopla	-.60556	.36180	.251	-1.5049	.2937

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The average number of frames for each phase differed for the *Bee* [ $F(2, 98) = 3.645, p = .030$ ]. A Scheffe post-hoc test indicates that the mean number of frames during pre-hoopla ( $M = 3.0870$ ) was significantly larger than that at post-hoopla ( $M = 1.994$ ), a finding that agrees with the hypothesized direction. That is, fewer frames are expected at post-hoopla as reporters winnow the most viable ones from the rest.

The average number of frames for each phase also differed for the *Register* [ $F(2, 130) = 5.347, p = .021$ ]. A Scheffe post-hoc test indicates that the mean number of frames at pre-hoopla ( $M = 2.2069$ ) was significantly smaller than at post-hoopla ( $M = 3.1579$ ), which partially agrees with the proposed direction.

The results show that H3 is partially supported. The average number of frames for the *Register* increased from 2.5 to 3.2 from hoopla to post-hoopla, the opposite of what was expected. The *Chronicle* cannot be fully analyzed since it did not enter the post-hoopla period during the study timeframe, but it did show a slight decrease in average number of frames used between the pre-hoopla period (2.7) to the hoopla period (2.33). Only the *Bee* followed the predicted pattern—it exhibited a decline in average number of frames used from 3.2 in the pre-hoopla period to 2.56 in the hoopla period to 1.9 in the post-hoopla period.

## Tone

Tone, or the story valence, is an important factor when assessing the way an issue is covered. According to the hoopla effect, as the cycle progresses, negative tone increases. Additionally, this study submits that when a region has a stake in the success of an issue or scientific discovery, the tone of regional media coverage is likely to be positive and remain positive for a longer period of time. Thus, RQ4 asks: What is the dominant tone of newspaper reports about ethanol at each hoopla stage?

To decipher tone in an article, coders were asked to identify the presence or absence of positive tone and the presence or absence of negative tone. Then, the data were reconfigured to determine whether tone was negative (1), neutral (2) and positive (3). Neutral articles are those in which both tones were present or absent. Table 20 shows the average tone of stories in each coverage phase for each newspaper. In this table, the closer the number is to 3.0, the more it indicates a positive tone.

**Table 20. Average tone of stories in each hoopla phase for the three newspapers**

<b>Newspaper</b>	<b>Pre-hoopla</b>	<b>Hoopla</b>	<b>Post-hoopla</b>
<i>Des Moines Register</i>	2.55	2.22	1.95
<i>Houston Chronicle</i>	2.23	1.96	N/A
<i>Fresno Bee</i>	2.22	2.23	1.89

Table 20 shows that the average tone across newspapers for each hoopla period hovers around neutral, though there are slight variations. The *Register* was the most positive in the pre-hoopla period (M= 2.55). Its tone went down at hoopla (M=2.22) and dipped below 2.0 during the post-hoopla period (M=1.95). Thus, the *Register* newspaper exhibited a tone pattern that goes with the hypothesized direction. That is, coverage was

expected to grow increasingly more negative over the course of the cycle. The *Chronicle*'s tone also became more negative with time (2.23 at pre-hoopla to 1.96 at hoopla). The *Bee*, however, started close to neutral in terms of tone at pre-hoopla (M=2.22), became slightly more positive at hoopla (M=2.23), but exhibited the most negative coverage at its post-hoopla phase (M=1.89). Overall, however, the data show that the three newspapers followed the predicted trend—that coverage would become more negative as the hoopla cycle progressed.

To answer H4 and H5 and determine whether the three newspapers differ in terms of tone across the hoopla phases, a series of single-tailed, one-way ANOVA tests were conducted. The results, shown in Table 21, indicate differences across the coverage stages for all three papers for  $p < .025$ .

**Table 20. Summary of one-way ANOVA tests for tone**

<b>Newspaper</b>	<b>Sum of squares</b>	<b>df</b>	<b>Mean square</b>	<b>F</b>	<b>p</b>	
<b><i>Register</i></b>						
<b>Between groups</b>	<b>4.436</b>	<b>2</b>	<b>2.218</b>	<b>5.667</b>	<b>.004</b>	
Within groups	50.873	130	.391			
Total	55.308	132				
Scheffe post-hoc						
		<b>Mean difference</b>	<b>Std. error</b>	<b>Sig.</b>	<b>Lower bound</b>	<b>Upper bound</b>
Pre-hoopla	Hoopla	.32819	.13453	.054	-.0425	.6988
	<b>Post-hoopla</b>	<b>.60436</b>	<b>.18464</b>	<b>.006</b>	<b>.0956</b>	<b>1.1131</b>
Hoopla	Pre-hoopla	-.32819	.13453	.054	-.6988	.0425
	Post-hoopla	.27616	.15875	.224	-.1612	.7135
<b>Post-hoopla</b>	<b>Pre-hoopla</b>	<b>-.60436</b>	<b>.18464</b>	<b>.006</b>	<b>-1.1131</b>	<b>-.0956</b>
	Hoopla	-.27616	.15875	.224	-.7135	.1612
<hr/>						
<b><i>Chronicle</i></b>	<b>Sum of squares</b>	<b>df</b>	<b>Mean square</b>	<b>F</b>	<b>p</b>	
<b>Between groups</b>	<b>2.183</b>	<b>1</b>	<b>2.183</b>	<b>4.034</b>	<b>.046</b>	
Within groups	79.575	147	.541			

Total	81.758	148				
<hr/>						
<i>Bee</i>	<b>Sum of squares</b>	<b>df</b>	<b>Mean square</b>	<b>F</b>	<b>p</b>	
<hr/>						
Between groups	1.714	2	.857	2.078	.131	
Within groups	40.424	98	.412			
Total	42.139	100				
<hr/>						
Scheffe post-hoc						
		<b>Mean difference</b>	<b>Std. error</b>	<b>Sig.</b>	<b>Lower bound</b>	<b>Upper bound</b>
Pre-hoopla	Hoopla	-.01594	.15751	.995	-.4519	.4201
	Post-hoopla	.32850	.20212	.272	-.2310	.8880
Hoopla	Pre-hoopla	.01594	.15751	.995	-.4201	.4519
	Post-hoopla	.34444	.17260	.142	-.1333	.8222
Post-hoopla	Pre-hoopla	-.32850	.20212	.272	-.8880	.2310
	Hoopla	-.34444	.17260	.142	-.8222	.1333
<hr/>						

There were statistically significant differences in tone across hoopla phases at  $p < .025$  for the *Register* [ $F(2, 130) = 5.667, p = .004$ ]. A Scheffe post-hoc test indicates that the mean tone during pre-hoopla ( $M = 2.5517$ ) was significantly more positive than the mean tone at post-hoopla ( $M = 1.9474$ ). There were also statistically significant differences in tone across hoopla phases for the *Chronicle* [ $F(1, 147) = 2.183, p = .046$ ]. In this case, a Scheffe post-hoc was not necessary because there were fewer than three cases, referring to the absence of a post-hoopla period. The Bee did not show a statistically significant difference in tone across hoopla periods. In effect, therefore, the distribution of tone across hoopla stages follows the hypothesized trend on increasing negative valence with time for the *Register* and the *Chronicle*.

To get a better handle on tone, the number of stories with a positive or negative tone present and the number of stories without either tone present were ascertained. These figures are shown in Table 22.

**Table 22. Number of stories with tones**

<b>Newspaper</b>	<b>Positive</b>	<b>Negative</b>	<b>Neither</b>	<b>Both</b>
<i>Des Moines Register</i>				
Pre-hoopla	17 (58.6%)	1 (3.4%)	7 (24.1%)	4 (13.8%)
Hoopla	28 (32.9%)	9 (10.6%)	33 (38.8%)	15 (17.6%)
Post-hoopla	4 (21.1%)	5 (26.3%)	6 (31.6%)	4 (21.1%)
<i>Houston Chronicle</i>				
Pre-hoopla	17 (38.6%)	7 (15.9%)	17 (38.6%)	3 (6.8%)
Hoopla	28 (26.7%)	30 (28.6%)	27 (25.7%)	20 (19%)
<i>Fresno Bee</i>				
Pre-hoopla	8 (34.8%)	3 (13%)	9 (39.1%)	3 (13%)
Hoopla	22 (36.7%)	8 (13.3%)	26 (43.3%)	4 (6.7%)
Post-hoopla	1 (5.6%)	3 (16.7%)	12 (66.7%)	2 (11.1%)
<b>Total</b>	<b>105 (27.4%)</b>	<b>66 (17.2%)</b>	<b>137 (35.8%)</b>	<b>55 (14.4%)</b>

Table 22 details the tone breakdown for all three newspapers within each hoopla period. Overall, the tone for all newspapers for all hoopla periods was neutral, in that 35.8% of stories had neither positive nor negative tone present. Yet, more than one-quarter (27.4%) of all stories had only a positive tone, while just 17.2% had only a negative tone. The fewest percentage of stories (14.4%) had neither tone present.

Of all three newspapers, the *Register* had the highest percentage of positive only stories (58.6%) during the pre-hoopla period, as expected. Positive stories dropped off as time went on for that newspaper, growing more negative in the hoopla and post-hoopla periods.

The *Chronicle* contained the highest percentage of negative stories of all newspapers during its hoopla period (28.6%). This newspaper also followed a predicted trend of declining positive tone as time went on.

The *Bee* increased by a scant two percent in positive tone in its hoopla period, but this record declined drastically by more than 30% in positive tone during the post-hoopla period to just 5.6%. The paper did experience an increase in the presence of negative tone as time progressed. These findings suggest support for H4.

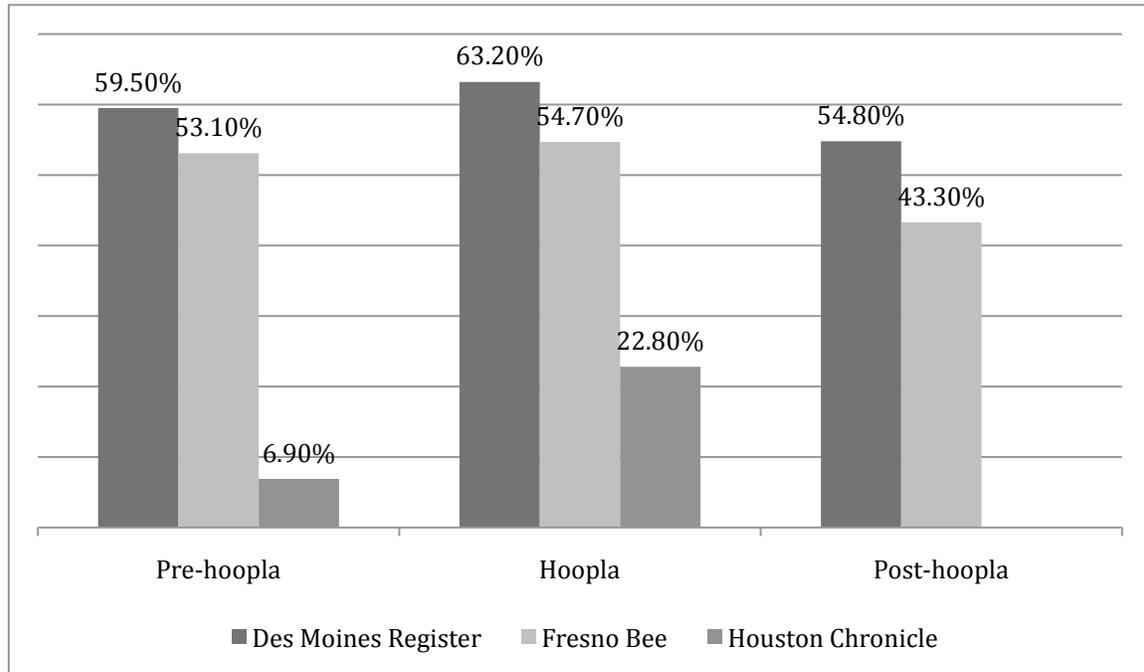
H5 takes into account the intensity of coverage in the *Register*, predicting that the newspaper's coverage will remain positive and heavy for a longer period of time than the other two newspapers. While the *Register's* coverage was more positive than the other two newspapers' during the pre-hoopla period, that positive level did not continue into the hoopla period. Referring back to Table 5, the *Register* did not have a longer period of time in the hoopla period than the other two newspapers. In fact, the *Chronicle* stayed in the hoopla period one year longer than the other two newspapers. Therefore, H5 is not supported.

### **The issue of localness**

The previous research questions and hypotheses posit a difference in the nature and characteristic of the three newspapers based on their socio-economic context. A potential significant predictor of the utility of a topic to a group of audiences is the extent to which stories contain a local flavor. One way by which this is demonstrated is through the use of local or non-local sources. That is, is the source speaking broadly from a national or outside perspective, or does that source have local knowledge? The frequency with which local sources are used suggests the newspaper's judgment of the importance of a topic (in this case, ethanol) to its service area. Local sources also add a layer of intimacy to a story. They enable local readers to better relate to the subject matter and

assess how important an issue is to their lives. Figure 3 shows the percentage of local sources used per story in each hoopla period by the three newspapers.

**Figure 3. Percentage of local sources used in the three hoopla periods**



As Figure 3 demonstrates, the *Register* used the highest percentage of local sources throughout the study timeframe. This newspaper quoted at least one local source in 80% of its stories. This suggests that the *Register* saw ethanol as an important local issue that needs to be explained by local sources.

The *Chronicle* had the least number of local sources quoted across the study timeframe although the paper has the most stories published on ethanol across the board. In fact, during the pre-hoopla period, only four *Chronicle* stories had one local source, and just one story had two local sources. Local sources have a stronger presence in the hoopla period, but only in about one-third of the stories. This finding suggests that the *Chronicle's* coverage of ethanol did not depend on local sources for information.

The *Chronicle* also relied heavily on wire services or stories from other newspapers to produce more than half (56%) of the paper's ethanol articles. Compared with the *Register*, which had nearly 90% of its stories written by its own staff, and the *Bee*'s 93% staff-written stories, the *Chronicle* clearly did not consider the ethanol issue as local as the other two newspapers. Not only did the *Bee* have a large percentage of stories from staff writers; two-thirds of its stories contained at least one local source.

In summary, the three newspapers' coverage of ethanol produced only one distinct hoopla cycle over a span of 10 years. The clear bell-shaped curve of coverage for the *Des Moines Register* and the *Fresno Bee* shows a distinct spike in coverage, marking the start of the hoopla period between 2005 and 2006.

The findings on source use suggest that politicians, ethanol industry workers and government officials weighed in extensively on the ethanol issue throughout the study timeframe. Many of these sources had a stake in the success of ethanol, and helped shape favorable coverage during the pre-hoopla period. These sources continued to routinely appear in articles, but as time went on, additional types of sources entered the coverage, adding more diversity and perspectives on the issue. Ethanol was no longer solely a commodity that would benefit farmers, the ethanol industry, governments and politicians; citizens, educators, scientists and environmental groups also were given a forum to voice their opinions.

The high use of local sources in the *Register* and the *Bee* demonstrates the local importance of the issue to the regions those papers serve, whereas the relatively few local

sources included in the *Chronicle's* coverage shows that the Houston area did not have such a deep local stake in ethanol.

The findings regarding frame use strongly suggest that ethanol was seen more as a political and economic issue rather than a scientific one. This was shown with the predominance of political, industry and economic frames throughout the study timeframe. This finding was surprising in that ethanol could have been originally conceived as a scientific issue but turned out to have few scientific frames present throughout the study timeframe. The most frequent frames used point to the dominant portrayal of ethanol as a political and economic issue that had deep local implications for two of the three newspapers.

The three newspapers were not statistically different in terms of the tone their stories exhibited across the three hoopla periods. The *Register's* coverage exhibited an initial dominance of positive tone, which then tapered off. This paper clearly had a more positive tone at the outset than the other two newspapers. The other two newspapers' tone throughout the study period remained much closer to neutral. This finding points to the initial bright perspective Iowa had on ethanol. The fuel has been hailed for its economic benefits to the region and environmental benefits as a replacement for MTBE, and politicians and industry representatives worked hard to promote it as a viable alternative fuel. Yet, by the time the *Register* entered the post-hoopla period, enough negative tone had crept into the coverage to balance out that very optimistic perspective.

As the country moves into an era when clean energy and "green" policy are two of the hottest topics, the debate about ethanol is not likely to disappear.

## CHAPTER V

### IMPLICATIONS AND CONCLUSIONS

This study set out to determine patterns in media coverage of ethanol through a content analysis of articles published from 1999 to 2008 in three newspapers whose respective service areas exhibit different dispositions about the topic. Secondly, the study aimed to expand on the attributes of coverage within each identified phase of the coverage cycle in terms of sources cited, frames used and tone of stories.

First, the study found the presence of pre-hoopla, hoopla, and post-hoopla stages in the sample consisting of 383 articles from three regional daily newspapers. The three newspapers—the *Des Moines Register*, the *Houston Chronicle* and the *Fresno Bee*—were chosen because of their geographic locations, perceived stake in the ethanol industry and similarity of reach and credibility. The three newspapers had very similar patterns of coverage, and their respective stays in each of the three hoopla periods were also very similar. The only major difference was the slight lag the *Chronicle*'s coverage had in its hoopla cycle. At the end of the study's timeframe, the *Chronicle* was still in the hoopla period, while the two other newspapers had already entered the post-hoopla period. In general, spikes in coverage intensity were triggered by events and developments that placed ethanol in the media agenda.

Second, the study found differences among the newspapers in the sources they cited. Determining what sources were used in the ethanol coverage helped to show which individuals and what groups were shaping that coverage. The hoopla effect predicts that sources that had a positive stake in ethanol would be quoted in the beginning of the cycle. As the cycle progresses, additional voices would enter the coverage, bringing more

controversy and balance. In this study, ethanol industry workers who are very much vested in the success of the industry were heavily quoted throughout the hoopla periods. The types of sources used remained virtually stable over time although there were slight variations among the newspapers. During the pre-hoopla period, the most-quoted sources were politicians or their aides, especially in the *Register* and the *Chronicle* where this pattern of sourcing continued to be strong during the hoopla period. Politicians—especially Iowa politicians—played a large role in generating government support for the use of ethanol as a gasoline additive. The *Bee* began sourcing industry workers more often as it entered the hoopla phase, due to stories that dealt more with its local ethanol industry.

The study also found that the majority of the articles in the *Register* and the *Bee* had at least one local source, while more than half of the *Chronicle's* stories did not have any local sources at all. The *Register* and the *Bee* also employed staff writers to cover the issue, while the majority of *Chronicle* articles originated from wire services or other newspapers. This finding indicates that the *Register* and the *Bee* considered the ethanol issue to be of much more local importance than the *Chronicle* did. However, it is important to note that because the president at the time, George W. Bush, was from Texas, stories that originated from other news outlets or wire services and included non-local sources could, in fact, have local significance as well.

Third, the predominance of political, industry, environmental and economic frames in all three newspapers suggest that the way the ethanol issue was explained to the newspapers' publics did not vary significantly across regions. Indeed, the issue had political, industry and economic implications in all three geographical areas studied.

Most dominant was the political frame, exemplified in stories that discussed government regulations to increase ethanol production, and in articles that explained tax incentives and agricultural subsidies to encourage ethanol production. The preponderance of the political frame dramatizes how politics affects the way the industry operates, and how political actors can sway environmental and other policies that guide the industry.

Politicians in Iowa and Texas, especially, weighed in heavily on the issue. For Iowa politicians, ethanol offers an opportunity to bring money into their districts and strengthen the region's economy. Texas politicians appeared to be on the opposite end of the spectrum, calling for more debate on an issue that competes with another strong Texas interest—oil.

In Texas, members of the oil industry, which has a large presence in that state, were heavily quoted—far more than in either of the other two papers. Many stories discuss how the oil industry is figuring out its role in the changing energy marketplace.

Fourth, the newspapers followed the predicted pattern of tone use as outlined in previous hoopla effect studies. According to literature, coverage is expected to start off positively before more negative stories enter the coverage. The tone of coverage in the three newspapers became more negative as time progressed, and this was statistically significant for the *Register* and the *Chronicle*. The *Register*, however, exhibited a more positive tone than its two counterparts during the pre-hoopla period.

These results point to regional socio-economic differences in the way ethanol is portrayed. In the *Register's* region, Iowa, corn-based ethanol and research on second-generation biofuels is a large part of the economy, and these issues became fodder for

news coverage. Clearly, the state has a large stake in the success of ethanol as an alternative fuel and sees ethanol as a close-to-home issue with national implications.

The *Houston Chronicle*'s coverage showed that ethanol was not a very strong local issue in that region. While the newspaper generated more articles than the *Register*, many of its articles were from non-*Chronicle* sources, such as the Associated Press and other wire services or other newspapers.

The *Fresno Bee*'s coverage of ethanol showed strong local ties. Its local ethanol company, Pacific Ethanol, dominated the discussion. Many sources from Pacific Ethanol and its partners were quoted, and this was the reason why majority of the articles included an industry frame. The coverage followed this company's rise and fall, and the hoopla stage revolved around the developments at Pacific Ethanol.

The findings of this study deviated from those of previous ones in that initial sources tended to be political figures, government officials and ethanol industry workers rather than scientists. In fact, scientists played a very small role in the coverage throughout the study period in all three newspapers. It can be inferred from these results that ethanol is much less a scientific issue than it is a political, economic or industry issue. As scientists and researchers continue to develop new second- and third-generation sources for ethanol, however, they could be more likely to influence coverage. Still, this study shows that the hoopla effect can be applied to examine the trajectory and attributes of coverage of non-scientific or non-technological issues as well.

### **Implications of the Findings**

Although a number of works have already examined patterns of newspaper coverage, this study analyzed in greater detail the characteristics of coverage in each cycle phase. Beyond coverage intensity or the ebb and flow of articles that managed to get media play, this study looked at the nature of coverage, including frames used, the number and type of sources cited, and the valence of coverage at each phase of the coverage cycle. In doing so, the results of this study offer greater predictive ability concerning pattern of coverage and how issues are likely to be discussed over time.

The findings of this study suggest that coverage cycles of scientific and technological issues can be extrapolated and applied to the study of political topics. Of particular importance is the role of sources in shaping coverage. This variable helps to explain why certain frames or tones are present or absent, what voices get louder and what gets tamed in the course of the cycle. In the case of ethanol, there was a gaping absence of scientist sources and consequently, science frames, which shows that ethanol was not perceived by the newspapers that covered it as predominantly a scientific issue. Rather, it began and remained a political and industry issue.

The findings lend support to the contention that regional needs and exigencies matter in shaping the coverage of a multi-faceted topic like ethanol. The results indicate that an Iowan is more likely to perceive the benefits and advantages of investing in biorenewable energy such as ethanol than someone from Texas mainly because of regional interests mirrored in the way the newspapers they read cover this topic. Like local legislators and local business people, local newspapers tend to boost or support local interests.

### **Study Limitations and Suggestions for Future Research**

This study was limited in its attempt to study attributes for the post-hoopla period. Because the *Register* and the *Bee* only spent one year in that period and the *Chronicle* did not enter the period during the study timeframe, it was impossible to get a full picture of the way the issue concluded in the cycle. It would be interesting to continue the study for a few more years to get a better understanding of the patterns of frame and source usage, and the progression of tone over time.

The results of this study provide additional data on the dynamics of the hoopla effect and on the impact of regional differences on the coverage of issues. Further studies on regional differences in coverage are needed to help explain why issue perception can vary from place to place. For example, a study that examines the performance of a newspaper that had no ties to the energy industry, perhaps a New England newspaper such as the *Hartford Courant*, may provide more insights into the influence of regional differences on nature of coverage.

The United States is far less dependent on renewable energy resources than other countries in Europe and South America. Comparing coverage in countries such as England, where ethanol is popular and gas prices are more prohibitive, and Brazil, a major ethanol producer and exporter, will shed more light on the influence of socio-economic contexts on media coverage.

Energy policy is and will continue to be an important topic in this country and the rest of the globe. Closer examinations of the media coverage of ethanol from a more

international perspective are likely to uncover the mechanisms by which information may help shape energy policy.

Lastly, a study that compares media coverage of an issue with public opinion is the most valid way of demonstrating any fissures between public opinion and media coverage. When an issue, such as ethanol, receives enough hype to catapult it into a hoopla phase, there undoubtedly will be at least as much—if not more—public opinion weighing in on the matter. Indeed, even contrasting newspaper editorials with op-eds and letters to the editor can provide deeper insights on the interplay between media coverage and public understanding of issues with local and national significance.

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## APPENDIX A

### CODING PROTOCOLS

**Period**=This will be a code that will come from the PRIMARY coding sheet in which the hoopla stage is recorded. Don't worry about entering anything in at this time. Leave blank.

**StoryOrigin**=Does the article come from a staff writer or editor, a staff report or is it pulled from a wire service or another newspaper? Sometimes the stories are rewrites of press releases.

In the byline of the story it will say something like:

By Shoshana Hebshi  
*Register Staff Writer*

That would be a staff-generated story, and so you code 1=newspaper staff. If it says a staff writer contributed to an AP report or something, it would be coded 1 and 2.

If the story is unattributed, it is most likely a staff report, but if you question this, enter 99.

If an article comes from *The New York Times* or *USA Today* or something but is in the *Des Moines Register*, code it 2.

If an article is contributed by a reader, like a letter to the editor or a commentary, code it 4=other and enter the person's name.

**Type**=This corresponds to the type of article. It is often easy to detect by identifying the section of the newspaper in which the article appears.

A news story is generally in the Metro or Front Page sections of the newspaper. Features can run in any section, but are set apart by their human interest appeal. Profiles of people are a good example of a feature story.

Business stories will describe markets, economy, the ethanol industry in a business perspective, energy companies, etc. Some articles on biofuels research can also fit into this category.

Agriculture stories will look at the agricultural side of ethanol, such as crop production and processing. Many stories about science and research can also be included in the agriculture code.

Some articles will not fit nicely into a category, or they may have been part of a special section dedicated to discussing biofuels and ethanol. Please mark those as 6=other, and enter the category as a string variable.

**S Otype=The type of source for each source quoted in the article. Record the type into the following categories:**

1. **Scientist:** A government, university, industry, association or independent scientist.
2. **Farmer:** An individual who considers his/her primary occupation to be farming and may or may not contribute to the production of ethanol either by growing corn or other ethanol-producing crops or by participating in an ethanol co-op or other production or investment facility.
3. **Ethanol industry worker:** An individual who works within the ethanol industry in companies such as Orion Ethanol and Pacific Ethanol. This does not include a farmer who produces ethanol.
4. **Oil industry worker:** An individual who works within the oil industry such as Chevron or British Petroleum. This includes gas retailers.
5. **Other energy industry worker:** An individual who works for a non-ethanol or oil company, such as MidAmerican Energy or Pacific Gas & Electric, which produces energy from sources such as natural gas and coal.
6. **Renewable energy association official:** An individual representing a renewable energy association, such as the Iowa Renewable Fuels Association.
7. **Agricultural association official:** An individual representing an agricultural association, such as the Iowa Corn Growers Association.
8. **Government agency official:** An employee of a government organization, such as the Department of Natural Resources or the Environmental Protection Agency.
9. **Political official:** An individual who is considered an elected politician or a specialized political aide, such as a governor, senator, mayor, governor's spokesperson or communication director.
10. **Educator:** An individual who by profession is an educator or instructor at an educational institution, such as Kim Smith, professor of journalism and mass communication at Iowa State University, or Nicole Smith, a second-grade teacher at Merrill Elementary in Des Moines.
11. **Citizen:** An individual who is not described as an official, farmer or worker in the capacities listed above. This person can be identified, for example, as Joe Ross of Mill Valley, Calif.
12. **Conservation/environmental non-governmental organization worker:** An individual who works for an organization primarily concerned with conservation

or environmental issues, such as Greenpeace, the Sierra Club, or Clean Water Action. These organizations do not receive funding from government agencies at the federal, state or local level.

13. **Other:** An individual who does not fit neatly into any of the above categories. This person, group or organization will be coded as a string variable. This category was re-analyzed to see if any major group is missing from the included list of sources. Enter as string variable.

**SOlocal**=Is the source quoted from a local agency or a citizen who lives within the newspaper's region? State agency workers and politicians are considered local, as are federal politicians who are from the region, such as a U.S. Senator from Iowa. If the origin of the source cannot be determined code a 3 for cannot determine.

**POStone**=Does the story contain any positive information or perspective about ethanol or the ethanol industry? Tone is only applicable toward ethanol.

**NEGtone**=Does the story contain any negative information or perspective about ethanol or the ethanol industry? Tone is only applicable toward ethanol.

**Framing:** The frames identified as variables in these articles will help to show how the story is being portrayed to the reader. The framing variables identified in the code sheet are generalized frames. Use your best judgment in determining which of the seven frames are present or not. And if you feel there is one present in an article that is not listed, please identify it as a string variable. Questions can be directed to me.

1. **Scientific:** Most sources and information in the article deal with the science behind ethanol production, or research and development efforts related to ethanol. Examples: *A researcher is looking into the most efficient crops to produce ethanol. Scientists don't agree on ethanol's contribution to energy efficiency.*
2. **Agriculture:** Most sources and information in the article are related to the agricultural aspect of ethanol, such as farming, crops, and farmers. Examples: *Farmers are receiving \$7 a bushel for corn that is going toward ethanol production. The president passed his farm bill, increasing subsidies for corn growers in Iowa.*
3. **Industry:** Most sources and information in the article are linked with the ethanol industry, either in its production or management. Examples: *Keck energy executives today announced plans for a new ethanol plant located outside Marshalltown. A manager at an ethanol co-op in northwest Iowa plans to expand production in the coming year.*

4. **Economy:** Most sources and information in the article are related to the economics of ethanol, such as prices of ethanol or corn and how it relates to the overall economic outlook for ethanol. Examples: *With gas prices at an all-time high, consumers are filling up on ethanol to reduce their cost at the pump. The market will determine the viability of biofuels and ethanol.*
5. **Environmental:** Most sources and information in the article are related to the environmental or conservationist perspective on ethanol. Examples: *It is important to keep an eye on the water table when an ethanol plant sets up in your town. Environmentalists warn of increased amounts of nitrogen in the soil from overplanting of corn.*
6. **Political:** Most sources and information in the article are related to politics through political figures, legislation, resolutions, and elections. Examples: *The president's new energy bill gives substantial attention to ethanol and its benefits as a source of renewable energy. Sen. McCain's stance on ethanol is an important factor among Iowa voters.*
7. **Social:** Most sources and information in the article are concerned with the social and community aspects related to ethanol; how ethanol is affecting people and communities. Examples: *Residents of this small town don't see the incoming ethanol plant as beneficial to their community. Supporting the ethanol industry in Iowa provides jobs and economic security for our neighbors and communities.*
8. **Other:** Any frame that does not fit neatly into these categories should be coded as other, and then entered as a string variable.

## APPENDIX B

**CODING SCHEME AND CODE BOOK  
ETHANOL IN THE AGENDA CONTENT ANALYSIS**

<b>Variable Name</b>	<b>Variable label</b>	<b>Values</b>	<b>Code</b>
CODER	Coder initials	First and last initials	
ID	Article ID number		
Newspaper	Name of newspaper	1= <i>Des Moines Register</i> 2= <i>Houston Chronicle</i> 3= <i>Fresno Bee</i>	
Date	Date of article publication	mm-dd-yy	
Period	Time period in the hoopla model	1=pre-hoopla 2=hoopla 3=post-hoopla	
StoryOrigin	Origin of article	1=newspaper staff 2=wire service or other newspaper (AP, etc.) 3=press release 4=other (enter as string) 99=not available Enter as many variables as needed	
StoryType	Type of article	1=opinion 2=news 3=feature 4=business 5=agriculture 6=other (enter as string variable)	
SOType	Type of Source	1=scientist 2=farmer 3=ethanol industry 4=oil industry 5=other energy 6=renewable energy association 7=agriculture association 8=government official 9=politician 10=educator 11=citizen 12=environmental/NGO	

		13=other (enter as string variable)	
SOLocal	Is Source Local?	1=local 2=not local 3=cannot determine	
POStone	Positive tone present	1=present 2=not present	
NEGtone	Negative tone present	1=present 2=not present	
SCIframe	Science frame present	1=present 2=not present	
AGframe	Agriculture frame present	1=present 2=not present	
INDUSframe	Industry frame present	1=present 2=not present	
ECONframe	Economic frame present	1=present 2=not present	
ENVIROframe	Environment frame present	1=present 2=not present	
POLframe	Political frame present	1=present 2=not present	
SOCframe	Social frame present	1=present 2=not present	
OTHERframe	Other frame present	Enter as string variable	

--End--

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