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Public Perception of the Natural Gas Industry: Data from the Barnett Shale

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Abstract *Data collected in a general population survey from a random sample of individuals in two counties located in the Barnett Shale region of Texas were used to empirically explore issues associated with public perception of the natural gas industry. Moderate support was found for the hypothesis that individuals residing in places with diverse levels of energy development exhibit dissimilar perceptions of the energy industry. Bivariate and multivariate logistic regression analyses indicate that residents of the county where the natural gas industry is more mature (Wise County) exhibit somewhat more negative perceptions of the energy industry than do residents of the county where natural gas industry is less established (Johnson County). The results also reveal that mineral rights ownership is a relatively strong and consistent factor associated with public perception of the natural gas industry. Possible implications of these findings for the energy industry are proposed, as are suggestions for future research.*

Keywords Barnett Shale, natural gas, public perception, survey research

Introduction

Every August since 2001, the Gallup Organization has polled Americans on their views of more than 20 business and industry sectors in the country. The survey asks respondents to rate each business and industry sector in the United States on a five-point scale ranging from "very positive" to "very negative." Between 2001 and 2011, the industries ranking near the top and bottom of the list have remained fairly consistent. Either the computer industry or the restaurant industry has topped the list as the most favorably viewed industry sector each year (the computer industry rated most favorably in 2001, 2002, 2003, 2004, 2008, 2009, 2010, and 2011; the restaurant industry rated most favorably in 2005, 2006, and 2007; Newport, 2007, 2011; Jones, 2008, 2009, 2010). Concomitantly, the oil and gas industry has constantly ranked at or near the bottom of the list.

In 2001, the year of Gallup's initial poll on the images of various business and industry sectors, roughly 24% of respondents viewed the oil and gas industry in a positive manner (either "somewhat positive" or "very positive"). That percentage increased by one percentage point in 2002. In 2003, the oil and gas industry had its highest rating, with 35% of respondents viewing it in a positive manner. One year later, that percentage dropped to 21, and in 2005 it dropped to 20. The percentage of respondents who rated the oil

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and gas industry positively in 2006, 2007, and 2008 were 15, 19, and 15, respectively. During each of the past three years, approximately one in every five respondents (21% in 2009, 20% in 2010, and 20% in 2011) regarded the oil and gas industry in a positive light.

For years, the Gallup Organization and other national/international polling entities have produced extensive macro-level survey results on perceptual issues surrounding the oil and gas industry for the mass media (Bolsen and Cook, 2008; Polling Report, Inc., 2009). Fewer theoretical and/or empirical academic research studies, though, have been conducted on public attitudes toward the oil and gas industry. The extant literature has primarily been limited to the oil industry off the shores of Louisiana and/or California (Coelho, 2006; Forsyth et al., 2007; Freudenburg and Gramling, 1993; Freudenburg and Gramling, 1994; Gramling 1996; Gramling and Freudenburg, 1996; Molotch et al., 2000). Surprisingly little systematic research has been directed toward understanding public perception of the onshore oil and gas industry in geographical areas where energy development is-or is quickly becoming-an integral part of the local society (i.e., areas where the production of unconventional natural gas is occurring; Anderson and Theodori, 2009). The findings from such work will likely prove beneficial to the oil and gas industry in its decision-making processes.

The purpose of this article is to advance the scientific literature on public opinion of the energy industry. Specifically, public perception of the natural gas industry in two Barnett Shale counties with differing levels of established energy development is investigated. In doing so, the hypothesis that individuals residing in places with diverse levels of energy development exhibit dissimilar perceptions of the energy industry is tested.

Data and Measurement

Data were collected in a general population survey from a random sample of individuals in two counties located in the Barnett Shale region of Texas. The counties selected as study sites included Johnson County and Wise County. The two counties were purposely chosen to reflect differing levels of established energy development. As of 2005, the year when the present research was conceptualized, the vast majority of natural gas production in the Barnett Shale reservoir had occurred in the Newark East field, which spans portions of Wise, Denton, and Tarrant Counties (Hayden and Pursell, 2005). From these three counties, Wise County, where much of the initial development was performed after the first well completion in 1981, was selected to represent a site with relatively mature development. Conversely, Johnson County, the county that was referred to at the time as an emerging "sweet spot" (Hayden and Pursell, 2005), was chosen to represent a site where large-scale exploration and production activities were just beginning.

In March 2006, interviews were conducted with six key informants in Wise County and 18 key informants in Johnson County to help identify timely and salient local social, economic, and environmental issues relating to energy development (Anderson and Theodori, 2009). The data gathered in the key informant interviews assisted in the development of a household survey questionnaire. Following a modified total design method (Dillman, 1978), the household questionnaire data were gathered using mail survey techniques. During the late spring and early summer of 2006, a survey questionnaire was delivered via the United States Postal Service to 1,533 randomly selected households in the two counties (749 households in Johnson County; 784 households in

Wise County).[1] In order to obtain a representative sample of individuals within residences, a response was requested from the adult in the household who most recently celebrated his/her birthday. The survey instrument, organized as a self-completion booklet, contained 42 questions and required approximately 60 min to complete. After the initial survey mail out, a post card reminder, and two follow-up survey mailings, a 39% response rate was achieved. This resulted in 600 completed questionnaires between the two sites (301 questionnaires in Johnson County; 299 questionnaires in Wise County).

Dependent Variable

The dependent variable *perception of the natural gas industry* was assessed using a list of 10 statements. Respondents were asked to indicate whether they "strongly agree," "agree," "disagree," or "strongly disagree" with each of the following items:

a. In the long run, I'm sure that people in this area will be better off if our natural gas resources are developed;
b. Natural gas industry operators in this area are too politically powerful;
c. Not enough information concerning the development of natural gas is being made available to the general public;
d. Even when carefully controlled, natural gas development is likely to upset the quality of life in a local area;
e. Too little attention is being paid to the social costs of natural gas development;
f. The natural gas companies have no compassion for our natural environment;
g. Natural gas operators MUST adopt and use more environmentally friendly drilling practices;
h. Natural gas companies will do only what's required by law;
i. Natural gas operators are drilling and producing too close to homes and businesses;
j. All in all, the benefits of natural gas development for this area are greater than the costs.

Responses were dichotomized into the categories of "agreement" (strongly agree and agree) and "disagreement" (disagree and strongly disagree). Items "b" through "i," which reflected more negative views of the natural gas industry, were coded as 0 = disagreement and 1 = agreement. Items "a" and "j," which suggested more positive notions of the natural gas industry, were coded as 0 = agreement and 1 = disagreement.

Independent Variable

In order to assess the public's perception of the natural gas industry in the two study sites with differing levels of established energy development, county of residence was dummy coded to indicate in which location the respondent lived. The use of this measure enabled bivariate and multivariate testing of variation between respondents from the two counties on the 10 perceptual statements. Johnson County, the county where large-scale

[1]The survey questionnaire was initially mailed to 800 randomly selected households in each county. Fifty-one questionnaires were returned as undeliverable from Johnson County; 16 came back from Wise County. None of the 67 undeliverable household addresses were replaced with new ones. Therefore, these 67 households were not factored into the final sample size. The sampling frames from which the samples were drawn consisted of county tax rolls.

energy exploration and production activities were just beginning at the time of the study, was chosen as the reference category (0 = Johnson County; 1 = Wise County).

Control Variables

Three variables—mineral rights ownership, personal/familial ties to the natural gas industry, and length of residence in the county—were included in this research as control factors. Mineral rights ownership (0 = does not own mineral rights; 1 = owns mineral rights) and personal/familial ties to the natural gas industry (0 = respondent and/or family members not employed either part-time or full-time in an occupation related to the natural gas industry; 1 = respondent and/or family members employed either part-time or full-time in an occupation related to the natural gas industry) were both dummy coded. Length of residence in the county was measured in years.

Results[2]

Prior to testing the hypothesis, the 10 perceptual statements were ranked in descending order by overall mean score (see Table 1). As indicated, at the aggregate level, the mean level of agreement was highest for the "negatively-worded" statement "Natural gas operators MUST adopt and use more environmentally friendly drilling practices." Conversely, the mean level of disagreement overall was highest for the "positively-worded" statement "In the long run, I'm sure that people in this area will be better off if our natural gas resources are developed."

Also shown in Table 1 are the Johnson County and Wise County respondents' mean scores for each perceptual statement. Level of agreement for the "negatively-worded" item "Natural gas operators MUST adopt and use more environmentally friendly drilling practices" was the highest for both Johnson and Wise County respondents. As was the case in the aggregate, the mean level of disagreement for both Johnson and Wise County residents was lowest for the "positively-worded" statement "In the long run, I'm sure that people in this area will be better off if our natural gas resources are developed."

Logistic regressions were used to analyze the differences in perception of the natural gas industry between Johnson County and Wise County residents. The analysis was conducted in two stages. First, the bivariate associations between the independent variable and each perceptual statement were examined. Then, in the second stage, the control variables were added to the model to determine whether or not the bivariate associations held at the multivariate level. Bivariate and net odds ratios for the county of residence variable are reported in Table 1.

At the bivariate level, moderate support was found for the proposition that individuals residing in places with diverse levels of energy development exhibit dissimilar perceptions of the energy industry. As shown in Table 1, Wise County respondents were significantly more likely than Johnson County respondents to agree with the following three statements: "Natural gas operators are drilling and producing too close to homes and businesses," "Natural gas industry operators in this area are too politically powerful," and "The natural gas companies have no compassion for our natural environment." Moreover, Wise County respondents were significantly more likely than their Johnson

[2]Cases with missing data on any of the variables used in the bivariate or multivariate analyses were excluded. Hence, a listwise deletion reduced the sample to 409 cases.

Table 1
Descriptive statistics and logistic regression results for perception of the natural gas industry

Perceptual statements	Mean scores			Odds ratios	
	Overall	Johnson county	Wise county	Bivariate analyses	Multivariate analyses
Natural gas operators MUST adopt and use more environmentally friendly drilling practices.	0.86	0.83	0.89	1.69	1.37
Natural gas companies will do only what's required by law.	0.79	0.79	0.78	0.92	0.83
Not enough information concerning the development of natural gas is being made available to the general public.	0.77	0.79	0.75	0.78	0.69
Natural gas operators are drilling and producing too close to homes and businesses.	0.70	0.63	0.78	2.07**	1.80*
Too little attention is being paid to the social costs of natural gas development.	0.67	0.64	0.70	1.28	1.08
Natural gas industry operators in this area are too politically powerful.	0.63	0.56	0.69	1.73**	1.68*
Even when carefully controlled, natural gas development is likely to upset the quality of life in a local area.	0.60	0.58	0.61	1.12	0.86
The natural gas companies have no compassion for our natural environment.	0.53	0.46	0.60	1.81**	1.60*
All in all, the benefits of natural gas development for this area are greater than the costs.	0.43	0.39	0.46	1.32	1.22
In the long run, I'm sure that people in this area will be better off if our natural gas resources are developed.	0.30	0.23	0.36	1.97**	1.93**

Note: The multivariate odds ratios were computed controlling for mineral rights ownership, personal/familial ties to the natural gas industry, and length of residence in the county.
$^{*}p < 0.05$; $^{**}p < 0.01$.

County counterparts to disagree with the item "In the long run, I'm sure that people in this area will be better off if our natural gas resources are developed."

The multivariate results indicated that controlling for mineral rights ownership, personal/familial ties to the natural gas industry, and length of residence in the county had very little effect on the statistically significant associations. An examination of the control variables (results not shown) revealed that non-mineral rights owners were more likely than those who own mineral rights to view the natural gas industry in a negative way. The mineral rights ownership variable reached statistical significance (at the 0.05 level) with 9 of the 10 perceptual statements. The only perceptual item that was not statistically associated with the mineral rights ownership variable was "Natural gas companies will do only what's required by law."

Additionally, respondents without personal or familial employment ties to the natural gas industry were more likely than those with personal and/or familial employment ties to the natural gas industry to agree with the statement "Too little attention is being paid to

the social costs of natural gas development." Furthermore, individuals without personal or familial ties to the natural gas industry were more likely to disagree with the statements "All in all, the benefits of natural gas development for this area are greater than the costs" and "In the long run, I'm sure that people in this area will be better off if our natural gas resources are developed." Lastly, respondents with shorter residency tenure in the county were more likely than their counterparts with longer tenure to agree with the statement "Natural gas industry operators in this area are too politically powerful."

Conclusion

The bivariate and multivariate results of this study provide modest support for the hypothesis. It appears that residents of Wise County—the county where the natural gas industry is more mature—exhibit somewhat more negative perceptions of the energy industry than do residents of Johnson County—the county where the natural gas industry is less established. Wise County residents were more likely than citizens of Johnson County to assert that the natural gas industry is drilling and producing too close to homes and businesses, is too politically powerful, and is uncaring toward the natural environment. Furthermore, Wise County residents were more pessimistic than Johnson County residents to avow that the development of natural gas resources would result in local residents being better off in the long term (cf., Anderson and Theodori, 2009).

The multivariate results also suggest that mineral rights ownership is a relatively strong and consistent factor associated with public perception of the natural gas industry. Conventional wisdom maintains that individuals who do not own mineral rights view the natural gas industry negatively, while those who do own mineral rights rate it more positively. This study provides the empirical verification. Future research, however, is needed to provide a comprehensive understanding of the reasons (economic and other) why the perception of the energy industry differs between the two groups.

Based upon the results of this study, two primary recommendations can be posed to the energy industry. First, as indicated above, over 8 in 10 individuals in each study site believed that natural gas operators must adopt and use more environmentally friendly drilling practices. In fact, an increasing number of industry operators are currently striving to satisfy energy demands while safeguarding the natural environment (Haut et al., 2009). These operators are producing hydrocarbons using an environmentally friendly approach to energy development, which includes advances in areas such as: rig technology (smaller and lighter-weight drilling rigs), drilling technology (directional, multilateral, extended reach drilling and pad drilling), waste management (reducing, reusing, and safely disposing of drilling wastes), low-impact access and transport (artificial or temporary road technologies to eliminate or reduce negative ecosystem impacts), and pollution control (reduced rig noise and air emissions). Funding and promoting informational and educational programs at the local level on the environmentally friendly drilling practices that have been adopted may be an effective strategy for operators to correct some of the public misconceptions about the energy industry.

Second, energy operators must make a more concerted effort to communicate openly with the public and enhance involvement at the community level. Local residents need to be informed about local energy developments. Open communication, including full disclosure about the potentially positive aspects and negative consequences of energy development, is likely to reduce the chances of rumors and inaccuracies about current activities and proposed developments. Moreover, finding ways to work with and give back to communities contributes to the connection between local residents and the energy

industry and, in turn, may decrease community dissatisfaction and increase support of industry operations. Such efforts will surely mean investments in time and money. Failure to do so, however, may prove to be even more time-consuming and costly.

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