

GETTING CLOSER TO PUBLIC OPINION: A DESCRIPTIVE AND GROUNDED
THEORY ANALYSIS OF HIGHWAY CONSTRUCTION IN CAVE AND KARST
SYSTEMS

By

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ABSTRACT

GETTING CLOSER TO PUBLIC OPINION: A DESCRIPTIVE AND GROUNDED THEORY ANALYSIS OF HIGHWAY CONSTRUCTION IN CAVE AND KARST SYSTEMS

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Public hearings and meeting records represent vast sources of information difficult to organize and analyze. The purpose of this chapter is to describe and establish the participants' basic information and their comments. In this research, I focus to organize, quantify and classify the stakeholders and their comments of public participation in Kentucky, Puerto Rico and Texas for the construction of highway or related infrastructure in cave and karst systems. Results per case include number of attendees, commenters, and 42 roles of the citizen. A total of 486 comments were read, classified and analyzed using NVivo 9 software to identify word frequency. In addition, I identified patterns in the public comment of each meeting and hearing with the Glaser classical approach of Grounded Theory methodology. This led to a depth analysis with the emergence of patterns and core variables led by a theory grounded in the data of participants' comments. The NVivo analysis resulted in three different word clouds constructed by the 100 most frequent words. In contrast, the Grounded Theory approach showed that regardless of the time, place, and commenters, the central concerns summarized patterns that revolved around the capacity to negotiate valuable aspects of an issue and for the agency the chance to comply with the legal requirements of public hearings.

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INTRODUCTION

Public hearings and meeting records are diverse, dense and challenging sources of information. Fiorino (1990) states that public hearings are the only institutional form within a wide range of categories where government agencies interact with the affected public. Detailed and in-depth analysis could help understand participatory mechanisms and their role in society. Research conducted on transcripts of 30 meetings for transportation planning showed that merely identifying supporters versus opponents might result in underestimating the complex representation of stakeholders and their concerns (Kihl 1985). Even though Chess and Purcell (1999) comment about public meetings being perceived as reactionary events where participants are invited to comment on, or expressed resistance, to agency proposals, the public can also be requested to offer their input for the development of plans.

My goal as other scholars is to evaluate mechanisms that could integrate findings and insights of specific study cases through comprehensive conceptual frameworks (Sabatier & Mazmanian 1980). These frameworks within public hearing records include long-term and accessible documentation of participants and their values and concerns. Moreover, due their nature, public comment periods are difficult to access and understand by citizens (Innes and Booher 2005). This lack of understanding could apply either to a government official managing the information at the time, or to a citizen who would like to understand the results of public input into a final decision.

Input of public during hearings is sometimes limited to the self-selection of the person, their interest and priority based on the decision taken in the process, time availability or even compromise with the topic. In Walters et al. (2000) own words: “as

the number of alternatives increases, the probability of achieving consensus around one alternative decreases.” Thus, a better description and understanding of who is participating and how, more comprehension and targeted communication or educational efforts could be offered in public participation processes.

Understanding the composition of the general public could frame basic descriptive information to guide researchers, agencies or any other stakeholders about public policy through valuable input of experiences, preferences and values as a compromise of legitimacy (Walters et al. 2000). As a result, this information could be the first step and the preamble of an in-depth analysis of big volumes of data such as public hearings records and focus on case specific studies.

The goals of the first chapter are the organization and classification of: (1) the stakeholders' participation and their role, and (2) the number and format of comments offered in eight public participation processes for Kentucky, Puerto Rico and Texas. Results of this chapter for stakeholders composition and quantitative data of the comments will offer a framework of reference to describe who is participating in the process, who has access to the process and their differences between stakeholders and case study. For the next chapter I describe the patterns of concerns throughout the public process based on the properties of Grounded Theory (Glaser 1998). Readers and future research in the public policy arena could benefit from the empirical analysis of these three study cases with an understanding of public hearing records and stakeholders composition by expanding literature and references of case-to-case studies in the natural resource arena. Although legal status and regulations seek public involvement and discussion, “The vast majorities of public participation mechanisms use

the least restrictive method of selecting participants: They are open to all who wish to attend. Actual participants are a self- selected subset of the general population.” (Fung 2006).

My initial research goal was to understand public concerns and how participants resolve conflicts in context specific areas. I analyzed the emergent main concerns and the valuable information the public shared with the agencies in a barely explored natural resources area: cave and karst systems. The three government or government appointed agencies I studied include the Kentucky Transportation Cabinet (Kentucky), the Alamo Regional Mobility Authority (Texas), and the Department of Transportation and Public Works (Puerto Rico). They were all responsible to request, conduct and document the public participation process. Regardless of the final outcome of this research, I resolved to focus on the public comments of participants during public hearings or meetings in three case studies located in the cave and karst systems. While pursuing the above-mentioned goal, and during the search of a content analysis methodology, a second goal became apparent. Later and as a researcher, I resolved to get closer to the data and let the public “speak out” with their own words rather than testing theories, creating models, or generalizing conclusions that might be irrelevant or might not fit these context specific case studies.

Conclusions, models and patterns for public participation in the natural resources arena help to identify mechanisms to avoid unwanted consequences such as lawsuits, furious citizens, frustrated public servants or project delays. Thus, after the search of more relevant mechanisms to the public concerns and evidence more grounded in the participants, I decided to test and understand public opinion within my subject of study

using Grounded Theory (GT). The scope of this study included the analysis of all available comments submitted to the transportation agencies during public comment periods, and included the final records for three case studies of the construction of highways and related infrastructure in cave and karst systems. These case studies share commonalities such as the environmental landscape (cave and karst systems), public participation (with written or oral comment), and the subject matter (the construction of a highway and/or related infrastructure).

In an effort to contribute to environmental management and to highlight the interaction of the multiple stakeholders (government officials or citizens) as well as the methodologies of public participation, I emphasized throughout the research the emergence of information grounded in public concerns and solutions within a specific context rather than agencies' proposals or the concerns of influential groups. Research experiences from the exploration of methodological tools during the final selection of GT are documented in this manuscript and could offer another perspective of methodological analysis to researchers in the natural resources arena.

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CHAPTER 1

Comments and stakeholders quantification and classification in the public hearings and meetings for the construction of highways and related infrastructures in cave and karst ecosystems, three case studies: Texas, Kentucky and Puerto Rico.

ABSTRACT

Public hearings and meeting records represent vast sources of information.

Obtaining and organizing the content can be a challenge. The purpose of this chapter is to describe and establish the participants' basic information and their comments, such as format, type of comment and number of comments. In this chapter I will organize, quantify and classify the number of the stakeholders and their comments. Each comment is the result of public participation in Kentucky, Puerto Rico and Texas during the input period for the construction of highway or related infrastructure in cave and karst systems. The results for stakeholders per case include number of attendees, number of commenters, and a total of 42 identified roles of the citizen. A total of 486 comments were read and classified by format.

INTRODUCTION

Public hearings and meeting records are diverse, dense and challenging sources of information. Fiorino (1990) states that public hearings are the only institutional form within a wide range of categories where government agencies interact with the affected public. Detailed and in-depth analysis could help understand participatory mechanisms and their role in society. Research conducted on transcripts of 30 meetings for transportation planning showed that merely identifying supporters versus opponents might result in underestimating the complex representation of stakeholders and their concerns (Kihl 1985). On the other hand, due to legal requirements concerning record keeping, the structure and characteristics of public hearings processes for generating

public participation, could be preferable to seminars or workshops (Mazmanian & Nienaber 1979). Even though Chess and Purcell (1999) comment about public meetings being perceived as reactionary events where participants are invited to comment on, or expressed resistance, to agency proposals, the public can also be requested to offer their input for the development of plans.

Scholars are evaluating mechanisms that could integrate findings and insights of specific study cases through comprehensive conceptual frameworks (Sabatier & Mazmanian 1980). These frameworks within public hearing records include long-term and accessible documentation of participants and their values and concerns. Santos and Chess (2003) mention the rarity and limited nature of systematic analysis conducted by the government agencies after the completion of public participation in environmental issues. Moreover, due their nature, public comment periods are difficult to access and understand by citizens (Innes and Booher 2005). This lack of understanding could apply either to a government official managing the information at the time, or to a citizen who would like to understand the results of public input into a final decision.

Input of public during hearings is sometimes limited to the self-selection of the person, their interest and priority based on the decision taken in the process, time availability or even compromise with the topic. Beierle (1999) comments that at the time to diversify the discussion about assumptions, values and preferences “all the affected stakeholders should be involved in the process on a level playing field.” For agencies’ or proponents’ public input, strategic decisions are influenced by the quantity of alternative solutions or level of interest and compromise by the stakeholder. In Walters et al. (2000)

own words: “as the number of alternatives increases, the probability of achieving consensus around one alternative decreases.” Thus, a better description and understanding of who is participating and how, more comprehension and targeted communication or educational efforts could be offered in public participation processes.

Understanding the composition of the general public could frame basic descriptive information to guide researchers, agencies or any other stakeholders about public policy through valuable input of experiences, preferences and values as a compromise of legitimacy (Walters et al. 2000). As a result, this information could be the first step and the preamble of an in-depth analysis of big volumes of data such as public hearings records and focus on case specific studies that could be common to other public process through the analysis of:

- who is participating or who is having the opportunity to express their point of views, experiences and values?,
- who have access to this public process?, and
- what are the differences of stakeholders involved in the process?

In the natural resources arena, local, state and federal agencies such as the Federal Highway Administration (FHWA) must work to “assure that possible adverse economic, social, and environmental effects relating to any proposed project on any Federal-aid system have been fully considered in developing such project, and that the final decision(s) on the project are made in the best overall public interest...” 23 United States Code § 135 (h)(1). At the state level, the FHWA Secretary “should consider the extent to which the State has developed an investment process that relies on public input and awareness to ensure that investments are transparent and accountable; and

provides reports allowing the public to access the information collected in a format that allows the public to meaningfully assess the performance of the State.” 23 United States Code § 135 (h)(1). Processes and outcomes of the FHWA are mandated by statutes, regulations, and executive orders that seek a “general approach to developing a public involvement/participation plan [that] contains elements that are relevant and responsive to all communities” (FHWA 2013). Pursuant to the law mentioned above, each record or public document for three proposals to construct highways or related infrastructure were requested.

The goals of this chapter are the organization and classification of: (1) the stakeholders’ participation and their role, and (2) the number and format of comments offered in eight public participation processes for Kentucky, Puerto Rico and Texas. Results of this chapter for stakeholders composition and quantitative data of the comments will offer a framework of reference to describe who is participating in the process, who has access to the process and their differences between stakeholders and case study. For the next chapter I describe the patterns of concerns throughout the public process based on the properties of Grounded Theory (Glaser 1998). Readers and future research in the public policy arena could benefit from the empirical analysis of these three study cases with an understanding of public hearing records and stakeholders composition by expanding literature and references of case-to-case studies in the natural resource arena. Although legal status and regulations seek public involvement and discussion, “The vast majorities of public participation mechanisms use the least restrictive method of selecting participants: They are open to all who wish to attend. Actual participants are a self- selected subset of the general population.” (Fung

2006). This same author establishes that persons with particular interests in a specific topic, such as seniors in discussion of Social Security issues, may be overrepresented or opaque the “open-to-all character” to actively participate and voice their position in their favor. Based on the publications review and observations, I hypothesized that regardless of whether public hearings are open to whoever wants to participate, those who could be directly affected or have special interest will participate more actively during the process.

Independently of statutory mandates, the product of this research and its relevance could be applied to the understanding of public composition, accessibility and relevance to case specific studies of public participation. Finally and as documented by Walters et al. (2000) benefits to stakeholders in general include introducing a descriptive framework to organize public participation through previous consulting processes and an approach of a design to address specific question versus the dilemma of dealing with unknown quantities of stakeholders and concerns once the process is underway. Meaning being preventive and consult public previously rather than dealing with resistance and lack of consensus.

METHODS

Choosing the study cases

Back in 2011 during my participation in the National Cave and Karst Management Symposium, I was interested as a graduate student in conducting research concerning public opinion about underground ecosystems. During the symposium, I conducted a series of interviews among the participants and experts in several fields of the speleology. My survey requested nominations of study cases for the

construction of either a completed or proposed highway or related infrastructure project (such as bridges, interchanges and extensions) within cave and karst systems in any state or non-incorporated territory. The ten participants proposed a total of eight states. Candidates included Florida, Indiana, Kentucky, Ohio, Puerto Rico, Texas, Virginia, and West Virginia.

In making a final case study selection, I considered available material that documented public opinion from the proposed transportation projects. According to 23 USC §128, overseen by the Federal Highway Administration within the United States Department of Transportation:

“Any State transportation department which submits plans for a Federal-aid highway project involving the by passing of, or going through any city, town, or village, either incorporated or unincorporated, shall certify to the Secretary that it has had public hearings, or has afforded the opportunity for such hearings...”

In particular, for this study the final selection must comply with the criteria included in 23 USC §128 and availability of public records for each case. From a total of eight requests only three records were available. Study cases for highway or related infrastructure constructions projects in cave and karst areas are Kentucky, Texas, and Puerto Rico (Fig.1.1).



Figure 1.1 Map with the three study locations: Kentucky, Puerto Rico and Texas.

Kentucky, the first case study, is situated in the east south-central region of the United States, and comprises a total of 104,656 square kilometers of total surface area. The second case, Puerto Rico, is situated east of the Dominican Republic and West of the Virgin Islands. The total surface area of the island is 9,104 km². Finally Texas, located in the south-central region of the United States includes 695,662 km² of total surface area. Although separated geographically, each study area shares commonalities in the presence of limestone geological formations and aquifers. All the study cases involved the federal matching funds for each construction project. Federal regulations were implemented throughout the public process.

The study cases are:

1. Interstate 66 (I-66) which was proposed between the cities of Somerset and London in Pulaski and Laurel Counties respectively, in the south-central part of Kentucky;

2. Interchange United States 281 / Loop 1604 (281/1604) which is located in San Antonio in southern-central Bexar County, Texas and
3. Puerto Rico Highway #10 (PR-10), which is located between the west-central municipalities of Arecibo and Utuado.

Getting the data and public comments analysis

I sought to use the data required by the FHWA described above. Physical or digital copies of public hearing records were found online or requested individually from the record custodian of each coordinating agency. For Interstate 66, the public hearing and meetings files were requested from the record custodian of the Kentucky Transportation Cabinet via email. A total of 829 pages in hard copy were sent seven months after the initial request. All files, with the personal information of the participants redacted were sent via regular mail due to the unavailability of an electronic version. By contrast, records for the Interchange 281 / 1604 project documented by the Alamo Regional Mobility Authority were downloaded from the Texas Department of Transportation official website (Alamo Regional Mobility Authority 2013). Copies of the PR-10 project were requested personally from the staff of the Environmental Studies Division of the Department of Transportation and Public Works in San Juan, Puerto Rico ten months after the initial electronic request. A staff member of this division digitalized and shared a digital copy of the original documents from 1968 in a flash disk. Currently, all the information is available online in the website: tukarso.blogspot.com. In addition, each transcript of the hearings on PR-10 was translated from Spanish to English by the author resulting in a total of 22,707 words. This translation allows for comparison and analysis of descriptive categories in the same language.

Due to the differences between handwritten and computer typed formats, hard copies of the Interstate I-66 in Kentucky files were digitalized to PDF files. An optical character recognition (OCR) was used to convert the PDF images into editable text. The optical character recognition application was selected and used online (Online OCR 2013). Due to the poor quality of some images, illegibility of handwriting notes, and limitations of the OCR software, I used the online voice recognition software Dictation (Digital Inspiration). This tool allows the user to read, export and edit the text in Microsoft Word documents after generating the text from the read material.

The body of the analyzed data includes oral and written public comments submitted to the transportation agencies and part of the official public participation record. All comments were typed and organized in three separate Microsoft Excel spreadsheets. Once all of the information was entered into the data matrix, I conducted three cycles of reading and editing in order to correct any misspelling, translation mistakes, or typographical errors.

Quantifying comments

To conduct the quantitative analysis of the public hearing records, each comment was read at least twice to identify the type of the stakeholder based on the participants' own words (Table 1.1). Subsequently, the number of stakeholders and comments was quantified (1. 2-1.3). For each public hearing, the number of participants was counted by the sign-in sheets independently of the number of times they participated in each public hearing or meeting. However, the participation rate, number and format of comments were counted based on each comment. Statements in questionnaires or comment forms submitted by couples (i.e., two persons) were counted once for the total

amount of comments. By contrast, participants were counted individually for the participation rate and the total number of commenters.

	date	activist	agro engineer	businessmen	business owner	children	civil engineer	commuter	community representation	CPA	doctor	driver of an existing road	engineer	farmer	frequent forest visitor	future property owner of area could be affected	government employee	house owner	juridic representation (county judge)	land owner	lawyer	local	mayor	non-local	NGO	owner	politician	potential consultant	property owner	property owner of area affected	realtor	representative municipal organization	resident	resident and/or business owner in the area	resident and/or business owner in area general affected	resident and/or business owner of area affected	resident and/or owner in the area affected	reverend	student	taxpayer	teacher	unknown	veteran	42 stakeholders
Kentucky	07.22 & 24, 2003	2			16						2	3				1									1			4				6							1	2	1			39
	11.29 & 30, 2004			1	3						26		1		2		4	1										1	29				2	4	20	11			2		1			108
	08.27 & 28, 2007	1		1	8						40							1											46			4	37							1				139
Texas	08.25.2007				2	29																		2								1												34
	01.11.2010			1	41	1		1	1			2												1	1							3								1				53
Puerto Rico	10.8.1968				4						2	2				1			1	2					2	2						3						1					1	21
	10.10.1968 (Arecibo)											2				2			1			1			5					1		2										1		15
	10.10.1968		1	1		9		2			1	4		1		2				3			2			1	1	1			4	6						2	1	1			43	
		3	1	1	5	110	1	2	1	1	74	2	8	1	2	6	4	2	1	1	5	1	2	3	9	3	1	6	75	1	4	25	39	4	20	11	1	1	8	2	3	1	452	

Table 1.1 Types and number of stakeholders in each public hearing or meeting in Kentucky, Texas and, Puerto Rico for construction of highways and related infrastructure in cave and karst systems.

Location	Public hearing and meeting	Number of comments
Kentucky	July 22 & 24, 2003	146
	November 29 & 30, 2004	95
	August 27 & 28, 2007	94
Texas	August 25, 2009	44
	January 11, 2010	68
Puerto Rico	October 8, 1968	10
	October 10, 1968	13
	October 10, 1968	16
Total		486

Table 1.2 Total number of written and oral comments in each public hearing or /meeting in Kentucky, Texas and Puerto Rico for construction of highways and related infrastructure.

Location	Number of stakeholders
Kentucky	286
Texas	87
Puerto Rico	79
	249

Table 1.3 Total number of stakeholders in each public hearing or meeting in Kentucky, Texas and, Puerto Rico for construction of highways and related infrastructure in cave and karst systems.

Regarding public input, I considered the number and format of each comment. The categories of stakeholders were created after reading all comments three times, and names originate from the participants' own words. The final list of categories was used and implemented consistently during the classification of the database (Table. 1.4). Each participant could be counted in one or more categories depending upon the information offered in the comment. For example, some commenters could be commuters as well as residents of the area affected. Those participants that returned empty or illegible comment forms or questionnaires were not counted in the stakeholders' categories. The total number of comments not counted includes six handwritten sheets for the state of Kentucky and one emailed comment for the state of Texas. Based in the exclusions of these comments there is no evidence that the content could bias the sample because the format of public comments such as handwriting procedures are unlikely to be correlated with the format and the opinion of the participant. In Texas public file one comment included the front cover letter but the comment attached to an email was not provided. The process to recover this information requires consultation to the participants and access to personal information of each author that could not be disclosed under open records laws by the Freedom of Information Act (FOIA). The decision to exclude these comments was taken on the FOIA personal privacy exemptions and the unclearness and non-readability of the authors' handwriting in the case of Kentucky for a one percent of the total of 486 comments.

RESULTS

Identifying classifying, and quantifying stakeholders composition

The results of my analysis depended on the availability and accessibility of information for each public hearing record. The amount and quality of data kept by the custodian agency varied from case to case, and directly influenced the results.

Public hearings and meetings

After all the information was gathered from the record custodians and the analysis was conducted, I found that a total of 1,645 individuals attended the public hearings and or meetings. The highest participation level was for the I-66 project in Kentucky with 1,266 persons, followed by 340 participants in the public hearings for the 281/1604 interchange of San Antonio, Texas. As mentioned earlier, due to the lack of materials in the public hearing records of Puerto Rico, only those persons that commented during the public hearings for PR-10 were counted as participants. The total is 39 persons. Also, some of the hearing files are missing pages that include, but are not limited to, assistance sheets, oral and written comments offered by the public. There are, therefore, minor gaps in the files for Puerto Rico and Texas. These minor gaps are apparently not important enough to open the decision to legal challenge.

Public comments

The public process for Kentucky presents the highest participation level with 335 commenters, followed by 112 in Texas and 39 in Puerto Rico. The percentage of commenters versus hearing participants for Kentucky and Texas is 26 and 33 percent respectively. Information about participation and the percentage of commenters for the PR-10 project was not available due to limited access and availability of the public

hearing records in the Department of Transportation and Public Works. During the whole public process, the recurrence participation rate (multiple comments from the same individual) in Kentucky was similar to Texas with one percent and 0.88 percent for the PR-10 project.

Quantifying comments and classifying their format

In order to identify and quantify the types of formats used by the public, a total number of 486 comments were analyzed. The greatest number of comments submitted to the Kentucky Transportation Cabinet was 335 (Table 1.2). For the interchange 281/1604 project in San Antonio, 112 comments were submitted to the Alamo Regional Mobility Authority. Finally the lowest participation of commenters was 39 for the Interstate 66 project in Puerto Rico.

The formats of comments submitted by participants varied from case to case and included those offered at the public hearing or meeting and others sent after the meeting but within the specific public comment period. To allow the early and continuing opportunities for comment, “For the Federal-aid highway program: [1] Each State must have procedures approved by the Federal Highway Administration to carry out a public involvement/public hearing program pursuant to 23 U.S.C. 128 and 139 and CEQ regulation; [2] State public involvement/public hearing procedures must provide for public notice and an opportunity for public review and comment on a Section 4(f) de minimis impact finding, in accordance with 49 U.S.C. 303(d) from 23 CFR 771.111 (h).” (Federal Highway Administration 2015). For all of the three cases, opportunities to make oral statements were available for participants during the days of the public hearings or meetings. Availability of other formats was lacking in the case of Puerto

Rico, and in the case of Kentucky was incomplete. For Somerset and London, Kentucky only those oral comments included in the public file for July 2003 were counted and analyzed.

The most frequently used formats during the hearings or meetings included a private court reporter, comments forms, questionnaires and letters. After the specific hearing dates, comments were offered via email, postal service, fax or hand delivered to each agency (Table 1.3).

The available information for the record of the 1968 public hearings in Puerto Rico was uniquely oral depositions. It is believed that subsequent meetings or hearings were held between 1968 and the 1990 (Rivera Herrera, 2012). The location and information discussed in subsequent meetings are not part of the decision-making record. In San Antonio, Texas during August 2009 and January 2010, comments submitted by the attendees were through oral statements and/or court reporter. After the hearings and during the comment period, interested parties sent their comments by email or post. In Somerset and London, Kentucky both hearings included methods such as oral statements, questionnaires and letters sent via email, post, fax, or other means not specified in the public hearing records. The primary response mechanisms for comments were those submitted in the agency forms and/or questionnaires, oral statements, emails, letters, court reporters, mailed letters and meeting evaluation forms and county court fiscal resolution (as indicated in Table 1.4).

Location	Public hearing and meeting	COMMENT FORMAT									County fiscal court resolution	Total
		Written					Oral	Fax	Court Report	Unknown		
		Comment Forms / Questionnaires	Emails	Meeting Evaluation forms	Mail	Letters						
Kentucky	July 22 & 24, 2003	100	8	0	3	3	29	1	0	2	0	146
	November 29 & 30, 2004	90	2	0	0	2	N/A	0	0	0	1	95
	August 27 & 28, 2007	80	2	0	5	7	N/A	0	0	0	0	94
Texas	August 25, 2009	18	9	1	0	0	16	0	0	0	0	44
	January 11, 2010	26	15	3	0	0	15	0	9	0	0	68
Puerto Rico	October 8, 1968 (Adjuntas)	N/A	N/A	N/A	N/A	N/A	10	N/A	N/A	N/A	0	10
	October 10, 1968 (Arecibo)	N/A	N/A	N/A	N/A	N/A	13	N/A	N/A	N/A	0	13
	October 10, 1968 (Utuado)	N/A	N/A	N/A	N/A	N/A	16	N/A	N/A	N/A	0	16
	Total	314	36	4	8	12	99	1	9	2	1	486

Table 1.4 Total number of comments submitted by format of public comments in each public hearing and meeting in Kentucky, Texas and Puerto Rico for construction of highways and related infrastructure.

Types of stakeholders

The count of stakeholders resulted in a total of 42 types, created from the words of each deposition (Table 1.1). The highest diversity of stakeholders was registered during the public process carried out by Puerto Rico, followed by Kentucky and finally Texas. These last two case studies showed a difference of only 12 stakeholder types. The most common categories of participants in descending order are: citizen (110), property owner in the area affected (75), driver of an existing road (74), resident and/or business owner of area affected (39), resident (25), resident and/or owner in the general area (20) and resident and/or property owner in the area affected (11). Citizens are those persons either living or not living close to the potentially affected area and resident include those living in the proposed area of the highway. Other categories such as activists, engineers, farmers, government employees, locals, legal representations, mayor, nonprofit organizations, politicians, representation of local governments, taxpayers, teachers or unknowns represent 13 percent of the whole stakeholders composition. Adding the categories of citizens, drivers and any type of property owner resulted in 63 percent of the total attendees to the hearings.

Implications of the construction of the highway vary based on the interest or impact to each participant. For the majority of the persons in all three case studies, offering their input is a way to express their individual preferences, get to know the impact and/or the level of impact to the surroundings they live or use. In other words, participants want to know the impact of change in their lives and when and where this will take place. More specifically, drivers want to know the course of the route during and after the construction, share their preferences on specific routes reducing

commuting time, economical investments or safety issues. On other hand, the second biggest group of participants, any type of owner in the proposed area or surroundings, fear or resist to lose their property and as consequence impact and change the place they inhabit and their lifestyle. These participants showed an active voice throughout all the input process, especially those in Puerto Rico and Kentucky where the proposed highways take place in rural areas.

The analysis conducted about the distribution and format of comments and stakeholders' role and composition in public hearings offered an accurate description of who is participating and how. Literature on participatory process defines public hearings as the most common form of face-to-face public involvement where interested and self-selected parties voice their preferences, values and assumptions to the decision-making body (Beierle 1999, Fiorino 1990, Lando 2003). The analysis of stakeholders in detail specifies who is the general public as defined by the participants' own words.

Understanding the role of participants could frame and offer a better idea of who is not involved in the process or those that could not access the public participatory process due to the nature of hearings where stakeholders are self-selected. Detailed descriptive information presented in this section show how defining participants' role could guide agency officials about the values and importance of stakeholders in future policy decisions. Also, understanding who is participating might lead to identify those who are not getting involved. Using available information for the year 2000 for the states of Kentucky and Texas from the US Census Bureau, we could consider other groups that might not be participating in the process. This population includes those in the group under 5 to 19 years old, groups of minority races such as American Indian, African

American, Asian and Hispanic or Latino, seasonal public that occupy rental vacancy or renters occupying housing. No census data were available for 1968 or for this decade 1970's from the census website.

DISCUSSION

This section summarizes the general trends of the data analysis for the public process of each case study. The results show different profiles. Information available plays a key role in the capacity to describe each case study. During the public discussions in Texas and Kentucky, questionnaires and agency forms were the more frequently used formats among participants. This represents more than half of the total, with 314 of 486 yielding 65 percent of the total number of comments for all case studies. Only oral statements were analyzed, and no trend could be identified due to the limited availability and accessibility of information for the PR-10 in Puerto Rico. Irrespective of the limited availability of oral statements in the public meetings records of Kentucky, oral statements were the second most frequently used format at nine percent. During November 2004 and August 2007 no oral statements were included in the records of the public input process in London and Somerset, Kentucky. A total of 31 oral statements offered in San Antonio, Texas represent 28 percent of the 112 overall comments during these public hearings.

Moreover, attendees offered 90 percent of all comments during the public meetings in Kentucky. In Texas, 78 percent of the comments were offered to the Alamo Regional Mobility Authority during both of the public meetings. Overall, attendees of the public forums represented the bulk of the total number of comments in both cases (87 percent).

Within the stakeholders, only seven categories represent 78 percent from a total of 42 categories. These seven categories are citizens, property owners in the area affected, drivers of an existing road, residents and/or business owners in the area affected, residents, residents and/or owners in the area and residents and/or property owners in the area affected. More than 50 percent of the comments were offered by categories of stakeholders including citizens, drivers of an existing road and property owners of an area affected through written formats of questionnaires and given agency forms during the eight days of public hearings and meetings.

As mentioned above, public participation varied from case to case and depended greatly in the information made available by the agency. Based on the commonalities in the content of stakeholders' comments, 42 categories resulted across all three case studies. Categories at the same time helped to link the content and the role or roles of each participant throughout the public input process. A total of 486 comments offered by participants showed how most of the participants prefer to share their concerns with the agency during the hearings and meetings. Even though classified as legal documents that should be accessible to citizens, public hearing records from Puerto Rico were limited in availability. The lack of centralization for public hearing records in the Department of Transportation and Public Works limited the analysis and identification of patterns. However, the rest of the public record showed patterns where more than half of the public participated during the public hearing or meetings. Stakeholders preferred to share their concerns in the format of agency forms or questionnaires. More than half, 65 percent, of the comments were shared in this way.

From a total of 486 comments shared by 447 participants, only 40 persons were responsible for almost 43 percent, or 208 comments, documented by all three transportation agencies. In both Kentucky and Texas a majority of participants also identify themselves as citizens. The relationship between participation and format of comments showed a higher participation during the hearings and meetings days.

Regardless of the effectiveness, validity, or viability of public hearings as institutional public input processes understanding who has access to this public process, which format participants use to share their comments, and what kind of information hearing records offered could lead to a better understanding and evaluation of the public hearing as participatory process, the representation composition and distribution and the level of commitment from specific actors. Limited definitions might not include important aspects of the composition of the public, accessibility of the public, and viability to participate. As defined by the FHWA, all public hearings must be open to the public but other limitations such as location, time availability, comment formats, input methodology or other personal reasons might exclude and trigger the capacity of representation or inclusion of specific actors. Future studies and observations could focus on the evaluation of the process itself to identify and facilitate limitations of specific sectors or the participatory processes. An approach of a detailed understanding of participants' role and the way they interact with agencies creates a more in-depth and unique analysis of the decision-making process of public hearings. On one side understanding who is participating, how they define their selves and who is having access to these participatory processes could facilitate decision-makers', proponent agencies', policy-makers', and stakeholders' efforts to frame concerns, share

information or communicate in more a targeted, value-oriented way. On the other side, also knowing who is participating and accessing the input process could lead us to identify those who are not doing it and explore their reasons. More information on this topic could contribute to describe or enhance participation of individuals that for one reason or the other cannot be included in the participatory process, regardless of whether presence of individuals is self-selected despite regulatory agencies' requirement that all are open to the general public. As consequences, other aspects such as diverse representation, legitimacy or inclusion could be addressed during the process and targeted beforehand to consider public concerns, preferences or values. As mentioned in the introduction even though Chess and Purcell (1999) comment how public meetings being perceived as reactionary events where participants are invited to comment on, or expressed resistance, to agency proposals, the public can also be requested to offer their input for the development of plans. In addition my study addresses as other scholars how evaluating mechanisms could integrate findings and insights of specific study cases through comprehensive conceptual frameworks (Sabatier & Mazmanian 1980).

Sharing their comments and implementing several strategies, participants managed feelings and uncertainty emphasizing diverse individual values once or several times to the proposed agencies. Based on the need for systematic analysis, basic information about comments and stakeholders, and more case-to case studies could offer a better perspective of the wide range of parties and “social goals” (Beierle 1999). At a smaller scale the methodology of this research offers an opportunity for those interested to identify the role of stakeholders involved in the process and

incentivize those who are not. In addition this study includes the analysis of two different settings where stakeholders' roles might vary, from rural areas with the cases of Puerto Rico and Kentucky and one urban in San Antonio, Texas.

Documenting and tracing participant composition, and the way they interact with agencies or proponents, could offer a unique opportunity to stakeholders. In a larger scale, the results of my study extend the descriptive framework body of literature of the stakeholders involved in public process in the environmental arena, with an emphasis on public discussion more specifically in cave and karst systems. Uniqueness of these case studies of constructions of highways in cave and karst systems offer a diverse and complex level of information due to natural characteristics on underground ecosystems such as topography, sensitivity of native or endangered species and their habitats, presence of water reservoirs and other technical aspects involved in construction projects. Future efforts could strengthen public input processes by incentivizing a more inclusive and a wider spectrum of the public and content of comments. This added value represents an opportunity for agencies to gain knowledge of public preferences, values and ideas before, during and after the presentation of projects and educational or recruiting efforts in the natural resource arena.

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CHAPTER 2

Public concerns to the construction proposal of highways or related infrastructure in cave and karst system during hearings and meetings, a Grounded Theory approach.

ABSTRACT

The aim of this study is to identify patterns in the documented comments offered by the public in meetings and hearings. All three case studies include similar scenarios with the proposal of highway construction in Texas, Kentucky and Puerto Rico.

Based on the content of files of the proponent transportation agencies, a total of 486 comments were analyzed using NVivo 9 software to identify word frequency. In addition, and later, a more in depth analysis was also conducted to identify patterns and core variables that could emerge and a theory grounded in the data of participants' comments. A Grounded Theory methodology was conducted using the Glaser classical approach of content analysis.

The NVivo analysis resulted in three different word clouds constructed by the 100 most frequent words. These include words referring to places, groups, objects, structures and project selections. In contrast, based on the abstraction of participants' comments, the Grounded Theory approach showed that five core variables gravitated in the public discussion to result in the formulation of a theory where the public reacted to the need of reducing uncertainty as a response to their access to information about the proposed project. Regardless of the time, place, and commenters, the central concerns summarized patterns that revolved around the capacity to negotiate valuable aspects of an issue and for the agency the chance to comply with the legal requirements of public hearings.

INTRODUCTION

Participatory forums are central topics in the natural resources arena at the local, national, and international level. Every decade from the mid-1960s stakeholders' participation has evolved through the beginning of the 21st century, with multiple and diverse experiences based on different practices and dynamics. These processes started with the awareness of the existence of public interests to a focus and inclusion of local perspectives in early stages of planning (1970's); to an emphasis in the development of techniques that recognize local concerns as a priority (1980's); through the increased use of participation as a default rule for the development of sustainable agendas (1990's). Starting in the new century, increasing attention to the limitations of the participatory process and failures of discussions and agreements during "post participation" periods have all come together to evaluate experiences and failures within the last fifty years (Reed 2008). As Reed mentioned in this publication, other researchers in natural resource management focused on, and are still aware of, the benefits that understanding local perspectives could offer while planning and making decisions (Department of the Environment, Transport, and the Regions 2000; Fiorino 1990; Hennon and Hildenbrand 2005; Kahn 2002; Lando 2003; López-Marrero 2011; Santos and Chess 2003). However, much of the literature emphasized the administrative or managerial models of public participation in the natural resource arena (Fung 2006; Beierle 1999; Rowe and Frewer 2000). The opportunity to gather diverse stakeholders responds to the legal requirements that federal transportation agencies imposed over local and state proponents to comply with diverse regulations.

My initial research goal was to understand public concerns and how participants resolve conflicts in context specific areas. I analyzed the emergent main concerns and the valuable information the public shared with the agencies in a barely explored natural resources area: cave and karst systems. The three government or government appointed agencies I studied include the Kentucky Transportation Cabinet (Kentucky), the Alamo Regional Mobility Authority (Texas), and the Department of Transportation and Public Works (Puerto Rico). They were all responsible to request, conduct and document the public participation process. Regardless of the final outcome of this research, I resolved to focus on the public comments of participants during public hearings or meetings in three case studies located in the cave and karst systems. While pursuing the above-mentioned goal, and during the search of a content analysis methodology, a second goal became apparent.

As a researcher, I resolved to get closer to the data and let the public “speak out” with their own words rather than testing theories, creating models, or generalizing conclusions that might be irrelevant or might not fit these context specific case studies. As a speleologist and activist in the natural resource arena in Puerto Rico, I became greatly interested in understanding the concerns of the multiple stakeholders in public hearings or comment periods. During my time in the Fisheries and Wildlife Department at Michigan State University I learned how to collect and analyze quantitative and qualitative data. It is evident that stakeholders, including government managers, need to be effective with the public and to respond to their concerns in various public participation evaluation frameworks. Regardless, the proponent agencies could lead the process to the gathering of multiple stakeholders, the analysis and summary of

recurrent concerns and respond with one-way answers without targeting the public interest or allowing its participation. In other words, they can do no more than what is required by law. In this study, I identified patterns in specific areas that could lead to a better understanding of the emergent trends. Conclusions, models and patterns for public participation in the natural resources arena help to identify mechanisms to avoid unwanted consequences such as lawsuits, furious citizens, frustrated public servants or project delays.

Thus, after the search of more relevant mechanisms to the public concerns and evidence more grounded in the participants, I decided to test and understand public opinion within my subject of study using Grounded Theory (GT). During my research, two content analysis approaches were used resulting in the final selection of classic GT as an analysis tool. This methodology allows me to be flexible in the emergence of concepts after later verifying how participants' main concerns and their resolution fit in the generation of a theory.

The scope of this study included the analysis of all available comments submitted to the transportation agencies during public comment periods, and included the final records for three case studies of the construction of highways and related infrastructure in cave and karst systems. These case studies share commonalities such as the environmental landscape (cave and karst systems), public participation (with written or oral comment), and the subject matter (the construction of a highway and/or related infrastructure). The purpose of this research was to understand what was going on in the world of the participants and how they addressed their problems. I explored two methodological approaches to assess these factors. For this, I used the GT

methodology, an uncommon analytical tool in the natural resources arena. GT methodology, developed by Bernie Glaser and Thomas Strauss in the 1960's, analyzed concerns of health professionals and terminal patients and motivators. Results and the implementation of GT methodology have been centered in the inductive reasoning characteristic to understanding what is going on around an evolving situation tested in diverse fields of social sciences, business, law, crime and politics. This approach contrasts with the deductive reasoning structure constantly used in the natural sciences arena including public participatory process. It is my intention to contribute to stakeholders an emergent theory of this substantive area of natural resource management. In addition, another legacy is to offer background information and methods to further analysis by agencies or other government bodies at the time to extend the classical analysis, integrate and respond to public interest after offering the opportunity of public hearings.

In an effort to contribute to environmental management and to highlight the interaction of the multiple stakeholders (government officials or citizens) as well as the methodologies of public participation, I emphasized throughout the research the emergence of information grounded in public concerns and solutions within a specific context rather than agencies' proposals or the concerns of influential groups. Research experiences from the exploration of methodological tools during the final selection of GT are documented in this manuscript and could offer another perspective of methodological analysis to researchers in the natural resources arena. In other words

"In attempting to address the real concerns of participants, using whatever perspective and methods will best address the purposes of the research, classic

grounded theory is perhaps more aligned with the direction in which modern healthcare research is traveling; seeing philosophical positions not as discrete, incompatible opposites, but as offering multiple and complementary approaches to understanding social phenomena.” (Breckenridge et al. 2012).

Regardless of the applicability of a specific topic, the selection of GT allowed me to approach the topic with a multidisciplinary and multivariate perspective on what is going on among the various participants. The constant comparison incentivized the identification of patterns, their categories and properties in the abstractions of time, people and place to form an emergent theory. As Glaser (2002) commented:

“In Doing GT, I endeavored to emphasize the complexity of the world and therefore the freedom, autonomy, and license required to write generated theory that explains what is going on in this world, starting with substantive area.”

Further, the GT approach established that all the data available to the researcher are a subject of study that only after constantly comparing incidents, patterns emerge in the generation of a theory that responds to the participant concerns and how they resolve a specific matter.

Participatory methodology allows the analysis of public hearings and meetings as this type of public forum so that citizen participation, already shared with authorities, could generate vast and dense sources of information and become a subject of study of public opinion. This specific case of public participation brings together government and the public to interact constantly within a regulatory framework in order to comply with multiple statutes, laws and regulations. Public hearings required by law do not specify any minimum or maximum of representation distribution or amount. Rather, compliance

requires the mere opportunity or opportunities for public venues where interested parties can share opinions with government agencies. Regardless of the structure and flexibility of this type of public participation, the legal requirements and documentation of comments in public records allow its subsequent reference and content analysis. The capacity and availability (based on my experience where sometimes materials could be limited, even against the law stated in 23 CFR 450.210 and 450.316, and might not be available or required extended waiting periods to acquire) to access dense amounts of information from multiple stakeholders could contribute to the empirical evidence and a deeper understanding of what participants have to say. As a consequence, results from this research could expand the body of case-to-case literature in the natural resources arena to what Reed (2008) called a “more action-oriented and site-specific approach” during public consultation during the environmental planning and decision-making phases. In addition, the results could extend and target multiple concerns offered by the public on what is mandated by law and other aspects such as the representation of stakeholders, the amount of participants and the frequency of participation.

Cumulative knowledge and future findings of relevant empirical studies including participants’ experiences and perspectives could open the door to the understanding and identification of patterns according to the participants’ concerns such as: communities, citizens, developers, government agencies and policy and decision makers. Also, future policy reviews and debate within the legislative branch could incorporate other aspects beyond the regulatory perspective of merely offering an opportunity for public expressions, and include diverse publics and integrate them into diverse stages of the planning, discussion and decision making process. In GT, this

analysis is conducted considering the relevance, modifiability and workability of the emergent patterns and conceptualization in a substantive area to fit a specific theory. The range of results includes content analysis and description of public concerns and future consideration of diverse content analysis methods as powerful tools of tracking and identifying public concern among the discussion topics.

METHODS

NVivo: a Qualitative Assisted Computer Data as content analysis tool

The purpose of this chapter is to identify the main concerns of the participants and identify patterns of interests. Comments, the qualitative data under study, were requested and gathered from public records of eight hearings or meetings conducted in different years between 1968 to 2010 in Kentucky, Puerto Rico and Texas. Hearings were held as part of the legal procedures for the proposals to construct highways or related infrastructure. A total of 486 comments were organized and coded using the Grounded Theory methodology. The process of gathering data was explained in detail in the first chapter of this thesis. As mentioned above, GT was selected as a methodology for the data analysis in order to promote the emergence of a conceptual theory based on fundamental social patterns within the substantive focus of inquiry (Glaser 2004).

Prior to the selection of GT, a brief literature review for Qualitative Data Analysis (QDA) and Computer Assisted Qualitative Data Analysis Software (CAQDAS) was conducted (Chess 2000; Welsh 2002; Hutchinson 2010; Lowe 2003). The review of publications was completed before becoming aware of the structure of classical GT, i.e. avoid any preconceived notion or theoretical reference. In my case, rather than

contradict this requirement, the literature review entails an exploration and selection of analytical tools to enable the emergence of a theory, such as established by classical GT. The exploration and final selection of GT as a qualitative research methodology responded to my interest in the expansion and interpretation of the results of CAQDAS and the future workability, relevance, fitness and modifiability in the emergent patterns.

Initially, NVivo was selected as a CAQDAS analysis tool because of the benefits at the time to deal with large amounts of data and the capacity to create visual illustrations of keywords. These innovations and tools offered by the software in comparison to other options are user-friendly in qualitative data analysis (Welsh 2002). This aspect is important for novice researchers, like me, without the expertise to make an experienced assessment of the various possibilities, including CAQDAS. In order to understand the software, I enrolled in two NVivo webinars where the package was explained. Quick results highlighted preliminary keywords in the public debate.

Content analysis: the generation of the lists of frequent words and word clouds

Data analysis of a total of 486 comments was conducted and classified by case and date. Subsequently, analysis with NVivo for frequency of words identified the 100 most frequent words. The list for each case study excluded those comments made by government officials or representatives leading the public hearing or meeting. This exclusion responded to the necessity of answering the research question of the public concerns and how they expressed their problems. During the analysis of the tables of frequent words, specific words were excluded such as names or proper names that referred to locations of the proposed project (for example: north, south, San Antonio, Texas, London, Somerset, Kentucky, Utuado, Arecibo, Ponce or Puerto Rico). The

software highlighted these as stop words. Each was typed and entered manually in order to be excluded from the original list of frequent words. Based on this criterion, additional stop words included prepositions, conjunctions, verbs not related to any specific preference, adjectives, transition and introductory words. Also, synonyms identified by the software were excluded automatically from the final selection. Words were selected based on the number of mentions and the relevance to the research questions.

Simultaneously with the generation of each the 100 most frequent words, illustration name word clouds were generated for each case study. These illustrations serve to summarize and highlight the keywords based on their frequency (word cloud or word tag). Each cloud presents each word varying in the size and color, related to the number of times it was mentioned. Words clouds were unique to each public comment period.

After the evaluation of the 100 most frequent words within their contexts, I went word by word to identify common themes or patterns within each context. This process responded to what Miller (2000 Exploration of First Time Motherhood) wrote is the organization of the data by coding and breaking down all the data into more manageable pieces of analysis. At the time I broke down the data, where memos and notes were taken, I noticed the limitations of NVivo to guide an in depth analysis. How is this possible? The analytical approach of NVivo, a powerful tool of content analysis, emphasizes the descriptive and subsequent “interpretative” and “reflexive” needs that depend initially in the identification of specific words by the software (Welsh 2002). Use of the software promoted fast tracking to summarize and search for the frequencies of

words in the documents, but inhibited the emergence from the “literal” to the “reflexive” approach. Welsh (2002) emphasized this concern as follows:

“In order to understand how the different themes knit together to form a whole, it is first necessary to analyze individual themes. Using NVivo to do this is difficult. Whilst it can be helpful in terms of counting who said what within a theme, in order to relate the theme to other ideas it is necessary to consider, for example, the memos written during the analysis process.”

After learning from experience, and once I understood the influence of the software in the analysis of subsequent phases that required the generation of memos and notes, I went back to the literature in order to understand the fundamentals of QDA. After additional reading, I understood that underlying research tools reference the fundamental elements of data based on the content of GT and a deductive process where all the data will be included in the analysis. The high dependency on the automated software to identify queries interfered with the capacity to interpret and reflect on the whole dataset. This characteristic of NVivo restricts the emergence of theory based on the pattern of behavior of the participants and any personal experiences in the natural resources arena. Glaser (2004) targeted this issue and the differences between GT and QDA methodologies when he commented that:

“QDA methods are quite worthy, respectable and acceptable. (...) the choice of methodology to render to research representation about qualitative data as scientific is the researcher’s choice. But there is a difference between received concepts, problems and frameworks imposed on data by QDA methods and GT’s

focus on the generation and emergence of concepts, problems and theoretical codes.”

Based on this statement and subsequent reading on GT, I understood that NVivo was useful to conduct basic qualitative data analysis for the dense amounts of information such as public records of my case studies. However, the software presents limitations in the flexibility and future research capacity to analyze the data from GT theoretical conceptual methodology. The limitations of the CAQDAS influenced the search of another methodological approach that could expand the scope of data integration through multi-disciplinary and multivariate thinking. In this next section, I will explain in detail how the methodological analysis was dominated by the search for alternative analysis tools to enable the emergence of a theory based on the classical GT model.

What is classical Grounded Theory?

Once GT was selected as the methodology, I decided to stick to the classical approach, also known as Glaserian GT. A review of GT methodologies was conducted. Different approaches such as those like Straussian (Strauss 1987; Strauss & Corbin 1990), Glaserian (Glaser 1978, 1992, 1998) and Constructivist GT (2003, 2006) were briefly studied. The purpose of this review was to understand the differences in the methodological aspects of the authors after the publication of *The Discovery of Grounded Theory* (1967) (Heath & Cowley 2004). Emphasis was given to identify differences among the approaches and choose the method that responded to the research questions for the public hearing records. The publications included Breckenridge 2012; Heath & Cowley 2004; Glaser 2002; Glaser 2004 and Strauss &

Corbin 1990. This review was not intended to be a literature review, but a quick assessment of the properties of each approach. It offered background information that supported the final selection of classical GT methodology.

The main reason to choose Glaserian GT involved the concise and clear steps of a constant comparison process based on the integrated patterns identified by the researcher, rather than the computer software. As consequence, this aspect leads to the generation of concepts, patterns, and a theory from the data. In addition, the prevalence of an inductive process promotes the emergence of concepts in substantive areas rather than articulated theories not fundamental to the participants' main concerns and how they express and attempt to resolve a problem. Finally, one of the most important properties in the conceptualization of GT is the capacity for the abstraction of time, place and people in order to generate concepts with enduring grab (Glaser 2002). To put it in another way, it is to change the question from "Who said what and when?" (Welsh 2002) to "What is going on in the world?" (Glaser 2002).

How data were analyzed with GT? Detailed methodology of classical GT

As mentioned above, the goal of the research is to identify and understand the main concerns of the participant and how participants constantly express and attempt to resolve their problems. Classical GT methodology promotes the emergence of these concerns and patterns through a highly structured methodological process. Glaser (1998) explains in his book *Doing Grounded Theory* that the emergence comes first as a big list of topics that are eventually reduced and conceptually described to focus on the main problem. This problem is grounded in the main concerns and the categories that emerge from the properties of incidents (Fig. 2.1). Additionally, my own memos

explained the behavior of the participants in a substantive area. During the coding and analysis of data, memos help to track ideas and connect relationships. My research analyzed and dealt with all of the public comments submitted during three comment periods for the construction of a highway or related infrastructure in cave and karst ecosystems.

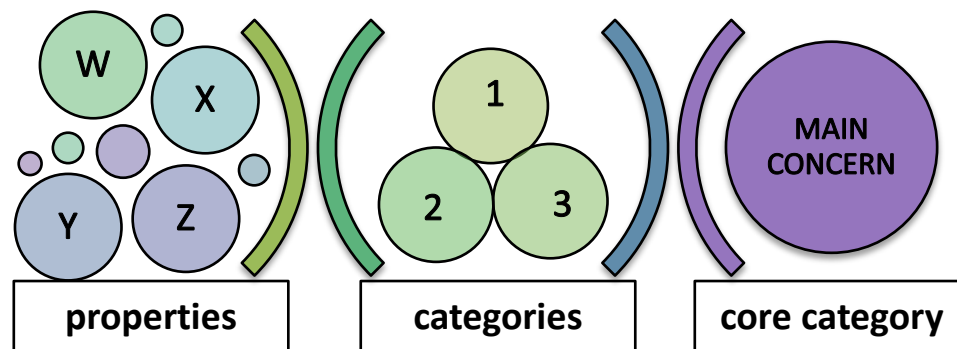


Figure 2.1 Illustration of the incident analysis units for the GT classical approach where the simplest unit of unique properties composed each category that through the identification of patterns in the constant comparative process and theoretical coding led to the emergence of a core category.

As mentioned above, the brief literature review led me to the selection of classical grounded theory as an analysis tool. However, the literature review for classical GT should be constantly avoided due to the potential influence preconceived concepts could have on the author's capacity to theorize and code over a specific theory or interest. Nevertheless, in my case the brief literature review allowed the subsequent identification of a useful methodology that could answer my research questions and offer a mechanism to analyze and deal with the multivariate aspects of public concern within the natural resources arena. Thus, this process was far from the adoption of a pre-established theory, but a step in the guidance process to identify a methodology.

In order to understand the methodology I learned the main aspects of GT for the analysis in the book *Doing Grounded Theory* (Glaser 1998) and several papers dedicated to how a novice researcher can perform this methodology. These publications are Breckenridge (2012), Glaser (2002), Glaser (2004), Glaser (2010). Once all the stages of the methodology were identified, I went over examples that could illustrate each step. The process emphasized allowing the researcher to follow a highly structured process, but with the flexibility to promote the emergence of patterns considering the different levels of the theorization of data with properties, categories, patterns and their saturation (Fig. 2.1).

The research started with the comparison of incidents. In my case, they are the documented stories of participants shared with the proponent agency or the agency in charge of the public process. By exploring each line and the whole data set, a constant comparison process was the initial step for analysis. It is important to mention that the main focus of analysis concentrated on the participants' concerns rather than time, location, or author of each incident.

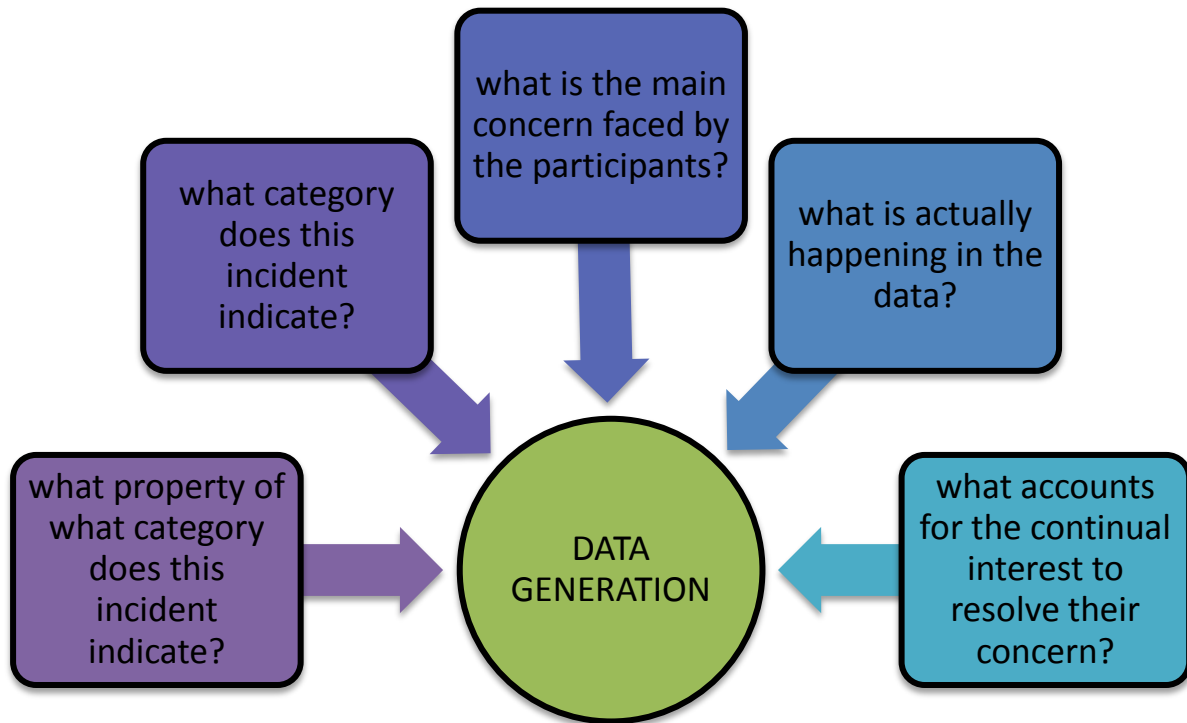


Figure 2.2 Illustration of the five main questions at the time to analyze and theoretically conceptualize the concerns of participants and how they constantly seek to resolve their problem (adapted from Glaser 1998).

Every single line that was conceptualized was read keeping in mind the five questions illustrated (Fig. 2.2). Simultaneously, the answers for these question categories and their properties were conceptualized and continually compared to others already created. This process establishes two of the pillars in the GT methodology: (1) basic analysis promotes the emergence of new properties and categories that occur after saturation, and (2) allow the formation of relationships and connections between patterns and incidents to the generation of theory. Glaser (1998) comments on the limitations of wrongly delimiting a problem based on presumed social concepts such as the example of homeless where “what they needed was not a home, but an identity rejuvenation so they had the internal strength to resource themselves with a home. People do not use resources when they have no identity by which to justify, organize

and feel right about the resource use.” This example, taken from the book *Doing Grounded Theory* (1998), explained how the concerns of the homeless could be conceptualized as the lack of a residence rather than a social challenge and development of self-identification, internal strength (property) to develop resources by themselves that could incentivize them to fulfill their needs (category) not only a house. Other examples in the same publication offered other perspectives of the results of GT analysis. In one case, Glaser showed that the quest for priority recognition of discoveries among prominent and average scientists is rather not motivated or directly relevant on the values of science where the first discovery is rewarded with the highest honors. Rather, they aim for a “contribution in some modicum way by publication with a small originality to their field in order to get promotion, have a career, have a family and have a life.”

During the constant comparative process, the main process of the analysis leads to the initial step of the generation of categories and properties that are either dependent upon or independent of a new or created category. Thus, the list expands to support existing, as well as new categories. The process continues until the saturation of each category is reached, as described below.

Continuous comparison helped me to generate meaning and saturation of each category and also to generate memos that facilitate the connection between incidents and patterns based on the participants’ own words and my conceptualization. The process of comparisons included three different types: (1) incident-to-incident; (2) concepts to more incidents; and (3) concepts to concepts. This process is repeated until saturation to keep grouping categories that fit, are relevant and work within a common

group, and later could modify a core category. As explained by classical GT, three central aspects are crucial to the formation of concepts: (1) emergence of patterns from the data (based on multiple incidents rather than just one); (2) saturation; and (3) interchangeability of indexes. When the continual comparisons and the “birth” of new categories and properties stop, then the saturation point was reached.

The process mentioned above contributed to the construction of a core variable and the answer to our research questions: (1) what are the main concerns of participants; and (2) how do they address these concerns? Glaser’s advice to grounded theorists during the analysis of big amounts of data was:

“The analysis will delimit itself as concepts are generated, a core category emerges, other categories and their properties emerge and they become saturated within the limits of a mountain of data. The delimitation and saturation by the interchangeability of indices will result in skipping and skimming over much of the over-abundance of data. Thus there is never too much data to go through, as much becomes superfluous.”

The relationships among categories were identified based on the indexes created in the sorting of memos that referred to empirically quantified categories. At this moment, new memos were written and helped eventually to trace those new emerging categories and properties as products of the comparison of the existing ones. A new set of questions was generated to understand the background information of a core variable. These questions are: (1) how concerns relate to each other in the continual interest to resolve the main concern(s); (2) what is the main concern faced by the

participants; and (3) what is actually happening in the data? This pattern identification is conducted considering fewer concepts, but covering the biggest amount of information.

RESULTS

NVivo: the first step toward a learning process

Findings in this section are divided in two parts. First, I will present results of the 100 most frequent words from the public comments for all three cases using the NVivo, a CAQDAS descriptive analysis tool. Second, the same data were analyzed with the classical methodological approach of Grounded Theory. This division, as mentioned before, resulted from the search of a wider and more in-depth content analysis approach to understand participant concerns in the construction of highways in cave and karst systems. The frequency refers to the total number of uses including multiple mentions in one comment and the number of comments mentioning a word. This count resulted in a metric that will enlist words by weighted percentage.

The results obtained with NVivo software included the 100 most frequent words contained in the public comments submitted to the agencies. This basic qualitative analysis resulted in three tables (Tables 2.1 - 2.3) with a total of 300 words and the word clouds (Fig. 2.3 - 2.5) for each case study.

Word	Length	Count	Weighted Percentage (%)	Similar Words
karst	5	207	0.94	karst, karsted
needs	5	203	0.92	need, needed, needs
study	5	167	0.76	studied, studies, study, studying
area	4	143	0.65	area, areas
build	5	143	0.65	build, building, buildings
highways	8	131	0.59	highway, highways
routes	6	117	0.53	route, routed, routes, routing
band	4	112	0.51	band, bands
people	6	110	0.50	people, peoples
home	4	109	0.49	home, homes
caving	6	108	0.49	cave, caves, caving
london	6	107	0.49	london
like	4	100	0.45	like, likely
want	4	98	0.44	want, wanted, wanting, wants
money	5	96	0.44	money
lands	5	92	0.42	land, lands
creek	5	89	0.40	creek, creeks
using	5	88	0.40	use, used, uses, using
property	8	86	0.39	properties, property
living	6	85	0.39	live, lived, lives, living
taking	6	84	0.38	take, takes, taking
waters	6	84	0.38	water, waters
times	5	82	0.37	time, timely, times
think	5	79	0.36	think, thinking, thinks
somerset	8	78	0.35	somerset
eis	3	77	0.35	eis, eis'
interstate	10	76	0.34	interstate, interstates, interste
way	3	76	0.34	way, ways
potential	9	75	0.34	potential, potentially, potentials
questions	9	75	0.34	question, questionable, questions
public	6	74	0.34	public, publication
impacts	7	74	0.34	impact, impacted, impacting, impacts
please	6	72	0.33	please, pleased
concerned	9	72	0.33	concern, concerned, concerns, concerning, concerns
traffic	7	71	0.32	traffic
community	9	70	0.32	communicate, communicated, communication, communications, communities, community
construction	12	70	0.32	construct, constructed, constructing, construction
county	6	69	0.31	counties, county

Table 2.1 List of the 100 most frequent words during three comment periods of I-66 in Kentucky during July 22 and 24, 2003; November 29 and 30, 2004; August 27 and 28, 2007.

Table 2.1 (cont'd)

Word	Length	Count	Weighted Percentage (%)	Similar Words
farms	5	68	0.31	farm, farming, farms
alternatives	12	67	0.30	alternate, alternates, 'alternates', alternative, alternatives
development	11	66	0.30	develop, developed, developers, developing, development, developments
state	5	63	0.29	state, stated, states, stating
comments	8	63	0.29	comment, commented, comments
informed	8	63	0.29	informal, information, informative, informed, informing
sinks	5	59	0.27	sink, sinking, sinks
valley	6	59	0.27	valley, valleys
meetings	8	58	0.26	meet, meeting, meetings, meets
exists	6	57	0.26	exist, existed, existence, existing, exists
plans	5	57	0.26	plan, planned, planning, plans
basin	5	55	0.25	basin, basinal, basins
segment	7	55	0.25	segment, segmenting, segments
option	6	54	0.24	option, options
environmental	13	53	0.24	environmental, environmentally
affected	8	52	0.24	affect, affected, affecting, affects
waste	5	52	0.24	waste, wasted, wasteful, wastefulness, wastes, wasting
right	5	51	0.23	right
national	8	50	0.23	nation, national
new	3	50	0.23	new
streams	7	50	0.23	stream, streams
cost	4	49	0.22	cost, costs
moving	6	48	0.22	move, moved, moves, moving
good	4	48	0.22	good
systems	7	48	0.22	system, systems
pulaski	7	46	0.21	pulaski, pulasky
corridor	8	45	0.20	corridor, corridors
forests	7	45	0.20	forest, forested, forests
transportation	14	45	0.20	transport, transportation, transported, transporting
drainage	8	45	0.20	drainage
process	7	44	0.20	process, processes, processing
lanes	5	43	0.20	lane, lanes
issues	6	43	0.20	issue, issues
local	5	42	0.19	local, localities, localized, locally, locals
short	5	42	0.19	short, shorts
place	5	42	0.19	place, placed, places
built	5	41	0.19	built
family	6	41	0.19	families, family
tax	3	41	0.19	tax, taxes

Table 2.1 (cont'd)

Word	Length	Count	Weighted Percentage (%)	Similar Words
works	5	40	0.18	work, worked, working, works
cemetery	8	38	0.17	cemeteries, cemetery
conduit	7	38	0.17	conduit, conduits
buck	4	37	0.17	buck, bucks
specific	8	37	0.17	specific, specifically, specificity, specifics
consulting	10	37	0.17	consultancy, consultant, consultants, consulted, consulting
daniel	6	37	0.17	daniel
house	5	37	0.17	house
improve	7	37	0.17	improve, improved, improvement, improvements, improving
ky80	4	37	0.17	ky80
boone	5	36	0.16	boone
complete	8	35	0.16	complete, completed, completely, completeness, completing, completion, completions
hope	4	35	0.16	hope, hoped, hopefully, hopes, hoping
believe	7	34	0.15	believe, believes
flows	5	34	0.15	flow, flowed, flowing, flows
kytc	4	34	0.15	kytc
present	7	34	0.15	present, presentable, presented, presently
assessment	10	33	0.15	assess, assessed, assessment, assessments
eastern	7	33	0.15	eastern
economic	8	33	0.15	economic, economical, economically
sediments	9	33	0.15	sediment, sedimentation, sediments
destroy	7	32	0.15	destroy, destroyed, destroying, destroys
federal	7	32	0.15	federal, federally

Word	Length	Count	Weighted Percentage (%)	Similar Words
alternatives	12	34	1.03	alternate, alternative, alternatives
benefit	7	31	0.94	benefit, benefited, benefits
years	5	30	0.91	year, years
affect	6	28	0.85	affect, affected, affecting, affects
industrial	10	26	0.79	industrial, industries, industry
land	4	26	0.79	land, lands
interest	8	24	0.73	interest, interested
time	4	23	0.70	time, times
plan	4	23	0.70	plan, planned, planning, plans
development	11	22	0.67	develop, developed, development, developments
study	5	22	0.67	studied, studies, study
town	4	20	0.61	town, towns
works	5	20	0.61	work, worked, working, works
neighborhood	12	19	0.58	neighborhood, neighborhoods
closer	6	19	0.58	closer
government	10	19	0.58	government
persons	7	19	0.58	person, personal, personally, persons
yellow	6	19	0.58	yellow
future	6	18	0.55	future
community	9	17	0.52	communicate, communicated, communication, communities, community
considering	11	17	0.52	consider, considered, considering
people	6	17	0.52	people, peoples
bridge	6	16	0.49	bridge, bridged, bridges
mining	6	16	0.49	mine, mines, mining
authority	9	15	0.46	authorities, authority
map	3	15	0.46	map, maps
question	8	14	0.43	question, questions
agriculture	11	14	0.43	agricultural, agriculture
economic	8	14	0.43	economic, economically
good	4	14	0.43	good
start	5	14	0.43	start, started, starting
distance	8	13	0.40	distance
farmers	7	13	0.40	farmer, farmers
progress	8	13	0.40	progress, progressive
live	4	13	0.40	live, lived, lives, living
region	6	12	0.36	region, regional
relocation	10	12	0.36	relocated, relocation
help	4	11	0.33	help, helping
station	7	11	0.33	station, stations

Table 2.2 List of the 100 most frequent words during three comment periods of PR-10 in Puerto Rico during October 8 and 10, 1968 in the municipalities of Arecibo, Utuado and Adjuntas.

Table 2.2 (cont'd)

Word	Length	Count	Weighted Percentage (%)	Similar Words
conditions	10	11	0.33	condition, conditioned, conditions
greatly	7	11	0.33	great, greatly
blue	4	10	0.30	blue
exit	4	10	0.30	exit, exits
expenses	8	10	0.30	expenses, expensive
far	3	10	0.30	far
river	5	10	0.30	river
traffic	7	10	0.30	traffic
reason	6	10	0.30	reason, reasons
curves	6	9	0.27	curves
facilities	10	9	0.27	facilities
necessary	9	9	0.27	necessary
soon	4	9	0.27	soon
sugar	5	9	0.27	sugar
uses	4	9	0.27	use, used, uses, using
bring	5	9	0.27	bring, bringing
city	4	9	0.27	cities, city
dollars	7	9	0.27	dollar, dollars
engineer	8	9	0.27	engineer, engineers
favor	5	9	0.27	favor, favored, favors
finally	7	9	0.27	final, finally
imported	8	9	0.27	import, importance, important, imported
inhabitants	11	9	0.27	inhabit, inhabitant, inhabitants
lack	4	9	0.27	lack, lacking
offer	5	9	0.27	offer, offered
opportunity	11	9	0.27	opportunities, opportunity
population	10	9	0.27	population, populations
property	8	9	0.27	properties, property
services	8	9	0.27	service, services
understand	10	9	0.27	understand, understanding
best	4	8	0.24	best
citizen	7	8	0.24	citizen, citizens
house	5	8	0.24	house, houses, housing
letter	6	8	0.24	letter, letters
life	4	8	0.24	life
meet	4	8	0.24	meet, meeting, meetings, meets
money	5	8	0.24	money
necessity	9	8	0.24	necessities, necessity
problem	7	8	0.24	problem, problems
production	10	8	0.24	production, productive, products
answer	6	7	0.21	answer
anything	8	7	0.21	anything
bypasses	8	7	0.21	bypass, bypasses
express	7	7	0.21	express, expressed
expropriation	13	7	0.21	expropriate, expropriated, expropriation

Table 2.2 (cont'd)

Word	Length	Count	Weighted Percentage (%)	Similar Words
flat	4	7	0.21	flat
forest	6	7	0.21	forest
hope	4	7	0.21	hope
red	3	7	0.21	red
since	5	7	0.21	since
topography	10	7	0.21	topographies, topography
tourism	7	7	0.21	tourism
trucks	6	7	0.21	trucks
urban	5	7	0.21	urban, urbanization
vehicles	8	7	0.21	vehicle, vehicles
better	6	6	0.18	better
cargo	5	6	0.18	cargo, cargos
committee	9	6	0.18	committee
country	7	6	0.18	countries, country
difficult	9	6	0.18	difficult
economy	7	6	0.18	economies, economy

Word	Length	Count	Weighted Percentage (%)	Similar Words
impacts	7	142	1.25	impact, impacted, impacting, impacts
roads	5	135	1.18	road, roads
toll	4	119	1.04	toll, tolled, tolling, tolls
traffic	7	113	0.99	traffic
ramps	5	108	0.95	ramp, ramps
rma	3	100	0.88	rma
improvements	12	97	0.85	improve, improved, improvement, improvements, improving
money	5	95	0.83	money, moneys
proposing	9	85	0.75	proposal, propose, proposed, proposes, proposing
building	8	79	0.69	build, building, buildings, builds
north	5	75	0.66	north
using	5	72	0.63	use, used, uses, using
plans	5	69	0.61	plan, planned, planning, plans
need	4	63	0.55	need, needed, needing, needs
access	6	59	0.52	access, accessibility
area	4	58	0.51	area, areas
people	6	57	0.50	people
txdot	5	57	0.50	txdot
time	4	55	0.48	time, timed, times, timing
environmental	13	53	0.46	environmental, environmentally
noise	5	53	0.46	noise
significantly	13	50	0.44	significance, significant, significantly
done	4	45	0.39	done
study	5	45	0.39	studied, studies, study
way	3	45	0.39	way, ways
overpasses	10	44	0.39	overpass, overpasses
public	6	41	0.36	public, publication, publicly
work	4	39	0.34	work, worked, working, works
aquifer	7	38	0.33	aquifer
concerned	9	38	0.33	concern, concerned, concerning, concerns
costs	5	38	0.33	cost, costing, costly, costs
congestion	10	37	0.32	congested, congestion
million	7	37	0.32	million
funds	5	36	0.32	fund, funded, funding, funds
capacity	8	35	0.31	capacity
categorical	11	35	0.31	categorical, categorically
exclusion	9	35	0.31	exclusion, exclusions
problem	7	35	0.31	problem, problems
park	4	34	0.30	park

Table 2.3 List of the 100 most frequent words during two comment periods of US 281/Loop 1604 in Texas August 25, 2009 and January 11, 2010.

Table 2.3 (cont'd)

Word	Length	Count	Weighted Percentage (%)	Similar Words
state	5	34	0.30	state, stated, states
effects	7	33	0.29	effect, effective, effectively, effectiveness, effects
businesses	10	32	0.28	business, businesses
right	5	32	0.28	right, rights
hollywood	9	31	0.27	hollywood
oaks	4	31	0.27	oak, oaks
stimulus	8	31	0.27	stimulus
travel	6	31	0.27	travel, traveled, travelers, traveling
understand	10	30	0.26	understand, understanding
water	5	30	0.26	water
connection	10	30	0.26	connect, connected, connecting, connection, connections, connects
direct	6	30	0.26	direct, directing, direction, directions, directly
Air	3	29	0.25	air
analysis	8	29	0.25	analysis
quality	7	29	0.25	quality
intersection	12	29	0.25	intersection, intersections, intersects
City	4	28	0.25	cities, city
highway	7	28	0.25	highway, highways
light	5	28	0.25	light, lighted, lighting, lights
tax	3	28	0.25	tax, taxes
south	5	27	0.24	south
causing	7	27	0.24	cause, 'cause, caused, causes, causing
neighborhoods	13	27	0.24	neighborhood, neighborhoods
connectors	10	25	0.22	connector, connectors
much	4	25	0.22	much
edwards	7	24	0.21	edwards
level	5	24	0.21	level, levels
meetings	8	24	0.21	meet, meeting, meetings
believe	7	23	0.20	believe, believes
consider	8	23	0.20	consider, considered, considering, considers
design	6	23	0.20	design, designation, designed, designing
pollution	9	23	0.20	pollutant, pollutants, polluted, pollution
level	5	24	0.21	level, levels
meetings	8	24	0.21	meet, meeting, meetings
believe	7	23	0.20	believe, believes

Table 2.3 (cont'd)

Word	Length	Count	Weighted Percentage (%)	Similar Words
consider	8	23	0.20	consider, considered, considering, considers
design	6	23	0.20	design, designation, designed, designing
pollution	9	23	0.20	pollutant, pollutants, polluted, pollution
species	7	23	0.20	species
available	9	22	0.19	avail, available
eis	3	22	0.19	eis
endangered	10	22	0.19	endangered
exit	4	22	0.19	exit, exiting, exits
freeway	7	22	0.19	freeway, freeways
good	4	22	0.19	good
highly	6	22	0.19	high, highly
increase	8	22	0.19	increase, increased, increasing
keep	4	22	0.19	keep, keeping
live	4	22	0.19	live, lived, lives, living
stone	5	22	0.19	stone
transportation	14	22	0.19	transportation
add	3	21	0.18	add, adds
alternatives	12	21	0.18	alternate, alternative, alternatives
claim	5	21	0.18	claim, claims
four	4	21	0.18	four
issues	6	21	0.18	issue, issues
listed	6	21	0.18	list, listed, listing, listings, lists
may	3	21	0.18	may
nepa	4	21	0.18	nepa
northbound	10	21	0.18	northbound
school	6	21	0.18	school, schools
allow	5	20	0.18	allow, allowed, allowing
zone	4	20	0.18	zone, zones
documents	9	20	0.18	document, documentation, documented, documents
non	3	20	0.18	non
paying	6	20	0.18	pay, paying
process	7	20	0.18	process, processes

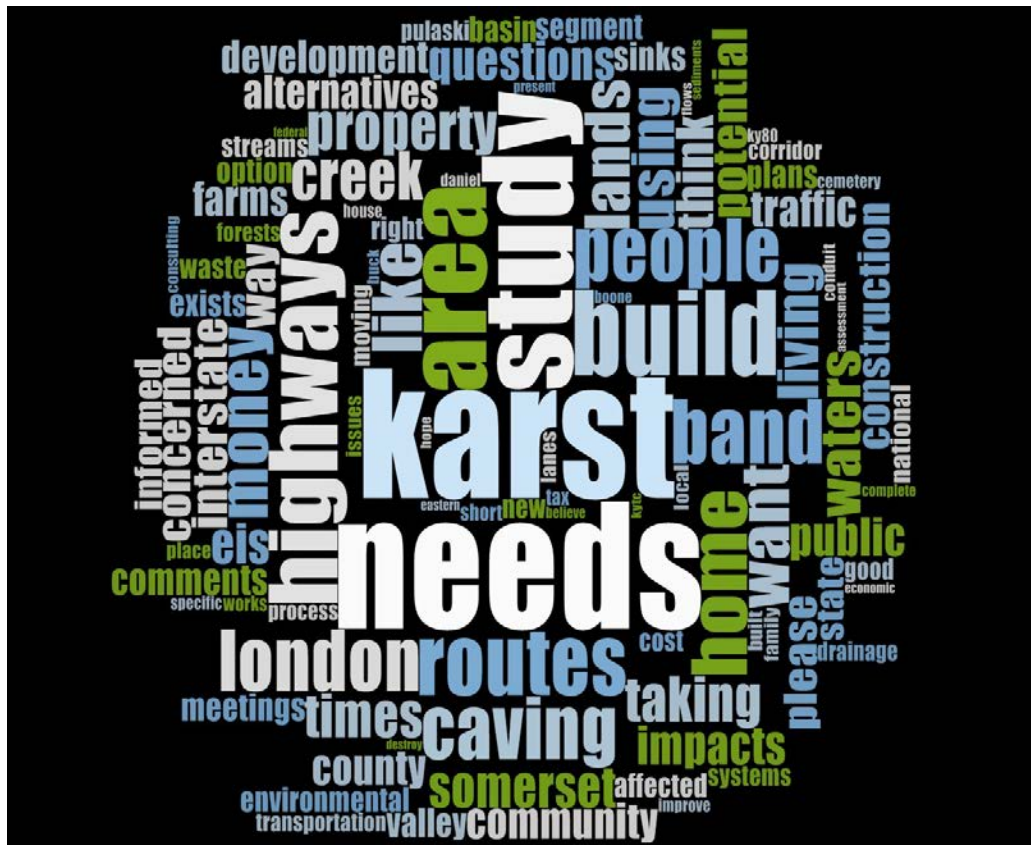


Figure 2.3 Word map of the 100 most frequent words from the public comment period of I-66 in Kentucky.



Figure 2.4 Word map of the 100 most frequent words from the public comment period of PR-10 in Puerto Rico.

illustration with a bigger size and are highlighted with different colors. For all three tables, words refer to topics like necessities for, or possibilities of, the project or the commenters, existing or planned infrastructure, natural or human resources, uses of the places and aspects related to time.

Since the analysis conducted with NVivo resulted in the selection of the 100 most frequent words and word clouds for each case, no more results were generated. Implications of the chosen words could offer a perspective of which aspects are constantly repeated by the public.

Getting an answer: using GT for an in-depth content analysis

The results of GT methodological approach showed how participant comments respond and react to the proposal of a highway located in cave and karst areas within their particular areas and interests. Glaser named the results as a product of the “theoretical meaning activity” or the abstraction of the literal words of participants grounded in their concerns. Since the process differs from the analysis performed with NVivo, all public hearings and comments were read and reviewed for the theoretical coding using the constant comparative analysis between incidents. Line-by-line readings were read three times. From this review, a total of five core variables were generated from 20 categories. After the formation of the categories, a total of three revisions were conducted to create relationships among incidents with notes taken from the memos and sorting to generate core variables. Saturation after a second round of constant comparison of the multiple incidents that occur allowed the formation of incidents and each core variable.

The production of data by constantly comparing incidents defined, formulated and corrected the dense quantity of properties for a specific category. It is also important to mention that the generation of hand written memos helped to trace the path and meaning in the formation of categories and relationship to other incidents, categories and properties. This information emerged from a constant comparative process of micro-incidents in all the public hearing records (Fig.2.6).

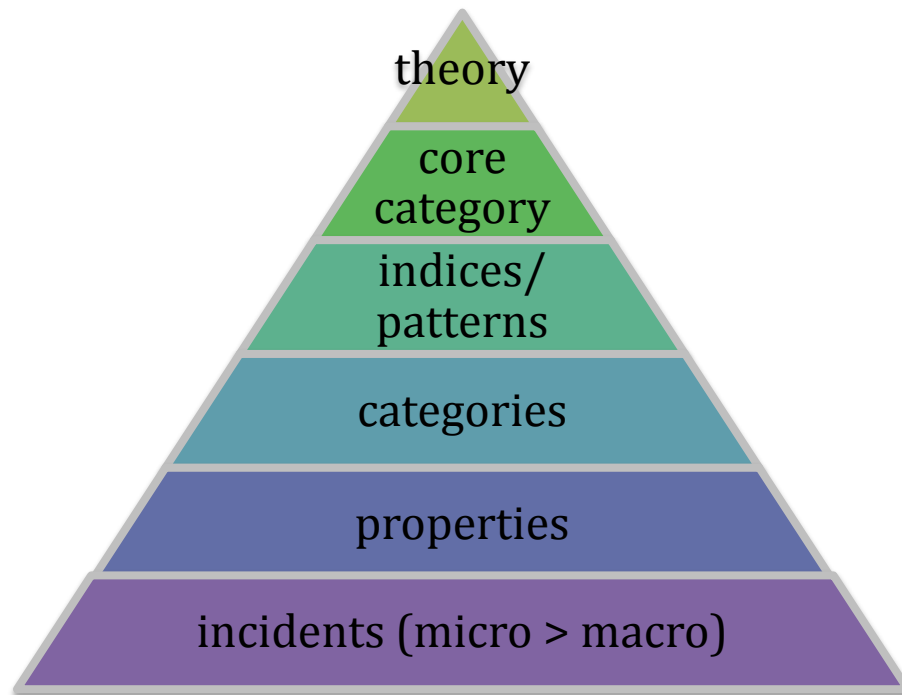


Figure 2.6 Illustration of the theoretical analysis and levels of information generated with GT methodological approach after the constant comparative process is implemented.

In summary the emergent core variables (Fig. 2.7) were:

- uncertainty of timing,
- protecting historical uses and particular spaces,
- the future as an influential force of conditional present,
- demand for information and

- the individualistic approach

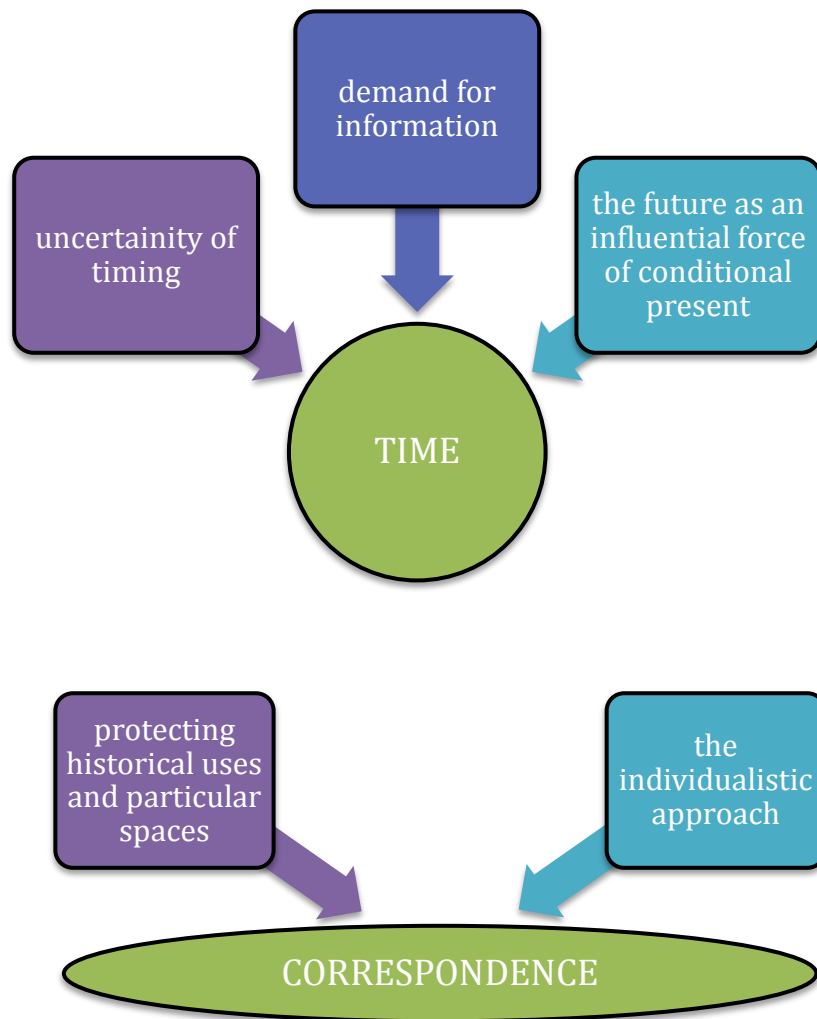


Figure 2.7 Summary of emergent core variables contextualized by the temporal and correspondence group.

In order to contextualize each variable, I will offer a brief description and examples for each emergent core variable found in the public hearings.

1. Uncertainty of timing, is the response to participants' needs for the reduction of uncertainty in order to plan, organize, avoid or adapt to a final outcome. Some examples include the following:

- a. “Now what interests me more, more than the location of the road, since I considered this is a technical matter and we, well, we do not have a big thing to say about this. What interest me more, and as mentioned by my friend the Mayor Emelindo Santiago is the time will take to start the road.”
 - b. “ We are secluded enough to have our privacy, but yet close enough to London for convenience. If just had some idea of the timeframe that were looking at, maybe we can make a few decisions, such as looking for new property.”
2. Protecting historical uses and particular spaces, could be noticed in the participants’ words relating or identifying themselves with physical spaces where nature, history, family relations, rural aspects are heavily described with memories and sentiments. This could be briefly evidenced in the following oral statements:
 - a. “My sentiment is use the existing highway. Don’t ruin small farms. You can’t put a price tag on somebody’s enjoyment on their farm, their personal property. There is no price tag for taking somebody’s land. (...) I would like to see a study that shows the need. And lastly, I have spend four years putting out small grains on my little farm to get a covey of quail in.”
 - b. “My name is Pam Taylor and my family has owned a farm that we owned in eastern Pulaski County for over 150 years. My parents own it today and about 7 or 8 generations owned prior to my parents inheriting it. We think we are the luckiest people in the county because of that farm, my dad

purchased a few years ago Short Creek. Which we think and I think most of you think is one of the greatest wonders of the world.”

- c. “ And as a student of architecture, I have come to recognize that downtown is one of the main places of quality and it’s counterpart is this almost pastoral countryside which lies around Somerset and every time I bring my friends here or I bring guests I always to show them something that is local. Something that they have not seen before and something that is not kitschy or that is gimmicky or something that is national and I show them the countryside and that is one of my favorite things to do is to take a ride in the country. I’ve grown up with farmers and I really appreciate the local quality. Whenever you put an interstate in, and this is proven back in the 1940’s and 50’s that destroys communities, that destroys local communities, it takes farmers who have invested a lot of their personal lives.”
- d. “My name is Brian MacCarty and I lived on Maple Grove Road and tonight is the first time I saw our property within the corridor. I have been opposed to I-66 from the beginning and now I’m really opposed to it. So, it does make a difference, it does make a difference how close you are to the interstate. I don’t care what anybody says, that makes all the difference. I farm almost 200 acres that has been in the family for over 3 generations. I have two daughters. One is 13-years-old that stayed at home tonight because she feared, this is what she feared. She didn’t want to be uprooted. So, my comment, not how feasible it is, not the cost-

effectiveness, I have a comment and that is how you tell your children that this farm ends with this generation and their hopes and dreams of staying on this piece of land is over.”

3. Future as an influential force of conditional present, also related with time relevance and how upcoming events, decisions and situations strongly influence how present and/or the mental state of an individual condition is affected by the decision of others.
 - a. “I want to supplicate you all, and I know you are doing all what is possible, I have no doubt you are really interested in that, that you decide for now and forever, that you do not keep us in this indecision, in this stressful wait.”
4. Demand for information , the lack of information and how this will result in the daily lives of those affected could be evidenced throughout the case studies. Participants seek a two way communication in order not to inform themselves necessarily but to reduce uncertainty and speculation:
 - a. “Okay. I’d like to see the overpasses and bridges constructed on 281 that was passed in a bond referendum many, many years ago. I would like to know why that did not happen when it was supposed to happen, and why is it getting hung up in all of this bureaucratic red tape?
 - b. “Have you taken in consideration how this will affect the property values for homeowners in Hollywood Park and other nearby neighborhoods near this? We bought recently in this area because it feels like a country

atmosphere and now we will potentially see the flyovers from our backyard.”

- c. “I am unhappy with the way things are going. I don’t know how much money you-all spend on these meetings where you ask the public for their input and then you don’t pay any attention to what we say. I don’t think you’ve ever bothered to listen to any other non-toll project, you know for 281. 281 northbound is one of the main problems we’re going to have, you know, in the future and you-all are just kind of disregarding, you know, with this – with this ramp that you’re building on the South side of 1604. That’s really all I have to say.”
5. And the individualistic approach, a core variable that shows how individuals tend to prioritize their own interests or those of a limited group of persons such as family members, community members, or institutions (schools, churches, training facilities, etc.)
- a. “I’m worried about that if I66 comes in that I will not receive enough money for relocation and payoff of my house so I’m against I66.”
 - b. “My father, mother, bother, sisters, uncles, aunts and many more family members and loved ones at rest there. Some go back to the mid 1800’s. My husband and I have our tombs there waiting for us to come our time. What I am asking is please by pass this little family cemetery and let them rest in peace till our Lord returns. We are not opposed to I66 in fact we need I66. But it should be done with “great respect” to all living and at rest.”

- c. “ I am an entrepreneur here in San Antonio and, obviously as a tax payer, I’m certainly very, very interested to make sure that the tax dollars that we pay, whether it’s federal government, the state government, we get the most bang for our buck.”
- d. “My wife and I have been living here for about six years. We bought six single-family homes here that we thought would be income. I’m in my mid-70s. And it looks like the property that we bought along 281 turned out to be a bad investment.”

The naming of each core variable was totally dependent on and responded to the workability and relevance of properties generated in the constant resolution of the participants’ main concerns. From the total of five core variables, the conceptualization of the participants’ main concerns can be summarized in the generation of one theory: getting to know the final decision as a condition of negotiation and trust. In other words, the prime mover of participants’ input is a matter of information accessibility in order to negotiate conditions and trust their capacity to influence the process and the outcome. Results of this theory excluded some individual cases, such as those where no comments were written or illegible comments. In addition, due to limited accessibility to the public records of Puerto Rico, I surmised that hearings conducted during the decade of the 1990’s were not analyzed.

DISCUSSION

NVivo: revealing first impressions

NVivo resulted in a proper tool for quick assessment of the participants’ key aspects or topics. This usefulness is limited for an in-depth analysis of a multivariate

approach of my research questions: what concern(s) do the overall participants share about the proposal of construction of a highway in cave and karst systems? And how do participants find solutions? The feedback as to the construction of a highway in the public comment periods of all our case studies resulted in the data generated from the participants' own words, also known as in vivo codes. The content analysis of the most frequent words with the NVivo tool showed a pattern, in that the top ten frequent words mentioned topics related to the discussion of time, needs, alternatives, infrastructure, spaces and planning of the projects. In the list of the 100 most frequent words, the list of words that emerge expands to include other areas such as social characteristics, natural resources, proponent agency, local elements, history, reference to places, call attention to items or situations, government organizational structures, access of information, regionalization, public policy, human presence, conception of progress, economic correspondence, accessibility and mobility. In summary, the word clouds highlighted frequent key terms during the public forums and referred to participant concerns of time, economy, information, physical spaces, family, infrastructure and natural resources.

The word clouds are an easy to read and practical illustration that offer a fast and organized summary of dense content files. As cited in the literature, CAQDAS offers word maps of recurrent terms or "red flags" based on the frequency of specific terms (Hutchison et al. 2010). In our case, NVivo offered a quick snap shot of a particular analysis unit in the natural resources arena. It can also be applied and used to analyze legal depositions, articles, interviews and websites, among other content sources. On the one hand, this content analysis tool could help stakeholders to identify hot topics in

the public record (usually voluminous and dense), to direct them quickly to each word, and, if desired, to understand how the word is used within its context. On the other hand, NVivo and CAQDAS content analysis tools depend initially on the frequency of words, which could wrongly emphasize the word itself and not the multiple ways (context, situations or incidents) a similar concern could be mentioned. Initially, dependence on the software analysis depended on chance and subsequent individual work because the early stage of the research was based on a numerical analysis that enhanced repetitive words independent of the concern of the participant and the specific context of the words.

The GT approach, closing the gap between impressions and concerns

GT methodological analysis was even more time-consuming due to multiple and rigorous methodological application during the line-by-line reading and analysis. This incentivized and prioritized the researcher to stay closer to the data. Listening to the participants' words and then conceptualizing based on the mentioned steps allowed the emergence of concepts based on participants' main concerns, and how they are trying to resolve their problems. The analytical approach of this research, as mentioned before, allowed a constant comparative process to saturate categories that would later represent the core category.

Relationships among categories and relationships among incidents showed that the public reacted to the need and necessity to reduce uncertainty as a response to the access or lack of information of the proposed project. Regardless of the time, place, and commenters, the central concerns summarized patterns that revolved around the capacity to negotiate valuable aspects of an issue. This, at the same time, influenced

the participants' capacity to constantly seek unknown, valuable information, and subsequently conditioned their capacity to prepare for what could happen next. This concern could be the analog of a crew floating in the middle of the ocean (start) where 360 degrees represented the possibilities and opportunities to influence the final outcome and get a specific product(s) (the final destination). What can or cannot be done is a matter of chance rather than a conscious decision based on information. This "voyage" depends on the information available or not available from the official source of information: the agency in charge of the public hearing. The core variable or main concern of the participants in the public meetings and hearings for the three case studies is to get to know information in order to negotiate and influence what could happen next. In contrast with the multiple desirable requests of the public during public hearings, agencies are merely required by law to offer opportunities where interested parties could express their opinions. This situation contrasts with the published literature and public concerns during these public hearings where opinion is integrated or taken into account in the decision making process. As mentioned in the introduction, the literature on public participation pushes for agencies to listen to stakeholder concerns and/or bring these concerns to influence the process or decision-making. This gap often will cause engagement or apathy among the individuals in the hearing process. Some of the implications in the general literature might concentrate in defining to a greater extent the characteristics of hearings and other participatory processes such as considering demographic variables to analyze the representation of excluded sectors, number of participants based on the population of an area, and identifying previous concerns in the planning from groups of stakeholders. Linking decisions and

participation processes to public concerns could also lead and incentivize a two-way communication where citizens could get involved in the process, rather than resort to court or legal challenges. Results of this study could incentivize a contemporary focus and subsequent evidence of literature that enhances the discussion within governing bodies, where the results of public hearings lead to consensus rather than time-consuming and expensive court challenges. As mentioned in the introduction increasing attention to the limitations of the participatory process and failures of discussions and agreements during “post participation” periods should focus in the analysis of past experiences and outcomes that fit the reality of the public discussion and failures within the last fifty years (Reed 2008). Gained experience and published literature in the natural resource management should prioritize in local perspectives during the planning and making decisions (Department of the Environment, Transport, and the Regions 2000; Fiorino 1990; Hennon and Hildenbrand 2005; Kahn 2002; Lando 2003; López-Marrero 2011; Santos and Chess 2003).

In conclusion, the trends and relationships in the concerns of participants included passive and active reactions to the transportation proposals that revolved around five main core variables: (1) uncertainty of timing (2) identity with space and history; (3) the future as a condition of the present; (4) speculation and; (5) an individualistic approach. Generalizations about these five components from the public are strongly influenced by time, the availability of information, and a two-way communication between those responsible for the public debate and the commenters. The participants found solutions to their concerns by: (1) sharing with the transportation authorities the need for the awareness of a time frame before construction; (2)

emphasizing identities grounded in history and places; (3) considering the future as a condition of the present; (4) reducing speculation by questioning and searching for information from the proponents; and (5) considering individual interests in the search for solutions.

Implications of my research in the natural resource arena include the comparison and collection of basic descriptive information of two different content analysis approaches: NVivo and Grounded Theory. These two methods, in my opinion, could complement each other based on the time availability and the researcher capacity to conceptualize. This information could benefit other researchers when choosing which content analysis tool should be selected based on the research questions and analysis requirements. Contributions based on my research experiences and learning process documented in the methodology and results sections along with all the existing literature production of CAQDAS and GT could be beneficial to graduate students or stakeholders involved in the analysis of public debates.

In addition, based on the current needs of public participation research and content analysis, GT could be an alternative analysis methodology from a context specific perspective to help understand participant-based criteria (Santos and Chess 2003), get a closer look at the social goals in environmental decisions (Beierle 1999), simplify multivariate complex governance systems (Fung 2006), keep track of public knowledge and perceptions of natural resources (López-Marrero et al. 2011), or engage the public in the planning and decision making of environmental management. Getting to know what people think and how they propose solutions is a multivariate, complex question that could be better targeted after the analysis of content, emergence of core

variables, and later the understanding and generation of a prevalent theory. Our theory, even limited to a specific area, might be the first step to the understanding of participants' concerns and the generation of a theory that would fit, work, and be relevant and modifiable to the public values, priorities and perceptions in the natural resources arena and public participation.

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