ECONOMIC AND SOCIAL IMPACTS OF RAPID SHALE OIL DEVELOPMENT IN WESTERN NORTH DAKOTA

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Title

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The Supervisory Committee certifies that this ***disquisition*** complies with North Dakota State University's regulations and meets the accepted standards for the degree of

DOCTOR OF PHILOSOPHY

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ABSTRACT

This dissertation comprises of five qualitative and exploratory studies. The studies focus on the social and economic impacts of rapid shale oil development, which is colloquially referred to as an "oil boom" on the communities and its members in western North Dakota. The dissertation presents a detailed exploration of the impacts and implications of the boom on community values and attitudes, quality of life, and community development. Impact of the boom on each topic is presented as an independent article or chapter. The data for the dissertation was collected through open-ended, face-to-face interviews. The findings highlight the opportunities created by the boom, barriers inhibiting community development, and the solutions necessary to achieve the community development potential created by the economic activity of the oil boom.

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I would also like to thank the North Dakota Humanities Council, Northern Plains Ethics Institute, and the Dickinson Research Extension Center for all the funding and logistics support.

DEDICATION

This disquisition is dedicated to my wife Tania who supports me in all the crazy dreams I pursue in my life.

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LIST OF ABBREVIATIONS

SOP	Sense of Place
SOC	Sense of Community
ATP	Attachment to Place
ATC	Attachment to Community
DOP	Dependence on Place
DOC	Dependence on Community
QoL	Quality of Life
SNA	Social Network Analysis
CCF	Community Capitals Framework
HUD	U.S. Department of Housing and Urban Development
FRM	Fixed Rate Mortgage
NDHFA	North Dakota Housing Finance Agency
HIF	Housing Incentive Fund
LEPP	Law Enforcement Pilot Program
CLT	Community Land Trust
FHA	Federal Housing Administration
USDA	United States Department of Agriculture

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1. PROBLEM STATEMENT

The first wave of rapid energy development and related literature materialized in the late 1970's and early 1980's. This literature examined, organized, and presented the impacts of rapid energy development on dimensions such as "social disruption hypothesis," "social impact assessment," and "boomtowns." A second wave of rapid energy development started around 2005-2007. This wave is primarily different to the first wave in terms of underlying technology and the concomitant logistical requirements. Therefore, the first wave of literature might or might not be pertinent in studying the impacts of this new wave of energy development, which must be examined.

North Dakota, which was the ninth largest oil producing state in the United States in 2006, became the second largest oil producing state in the United States in 2012, as a result of rapid energy development. From 2005 to 2013, the oil production in the state, which is completely concentrated on the western part of the state, increased by more than eight times. The media reports from the area clearly highlight the social and economic transformation in western North Dakota, as a result of rapid shale oil and gas development. Therefore, there is a strong need to study the social and economic impacts of the oil boom on communities and its members in western North Dakota, in order to position the communities on a path of development that envisions the boom as an enabling mechanism, to build better communities compared to what existed before the boom**.**

1.1. Introduction

Western North Dakota was once characterized by small rural communities, largely dependent on agriculture. But the 2005-2007 oil drilling resurgence, enabled by new fracking technology and high energy prices instigated a full scale oil boom,[1] which has significantly – and perhaps, essentially - changed nature and context of these rural communities (Bangsund & Leistritz 2011).

The present oil development in western North Dakota provides a valuable opportunity to study the effects of an oil boom on rural communities. Cortese and Jones (1979) outline several factors differentiating an energy boom from other types of booms. First is the scale and rapidness of population growth. Second, several communities within a geographic region are affected simultaneously, rather than a narrower geographic area. Third, the booms occur in long-established, relatively stable, agricultural communities. Fourth, large number of workers leave when construction/drilling is completed, thus a bust is built into the boom.

Two conditions differentiate Western North Dakota's boom from any other energy boom. First, the area experiencing the boom is a rural area that has experienced two previous booms. The community experiences of the former rapid expansions of oil development were not overall positive or favorable, as the bust badly hurt the communities. Second, the current boom began during a period of time when the American economy was going through the worst recession since the Great Depression. As a result, the boom received a lot of national media attention and attracted many people from all over the country to which used to be an area with low population

[1] An oil boom is defined as an increase in oil drilling activity and the induced secondary and supporting economic activity in other sectors such as housing, infrastructure construction, related services, and the concomitant changes in social landscape

density. These conditions create an interesting context in western North Dakota for examining the impact of the oil boom on several topics of importance such as: (1) quality of life of community members; (2) attitudes towards the oil boom; and (3) community development efforts necessary to address the issues or challenges created by the boom.

Unfortunately, traditional public involvement mechanisms such as public hearings, comment periods, and town hall meetings used in community decision making are usually ineffective at capturing such broad topics in detail. The economic and political interests pertinent to a development alternative tend to frame the focus of traditional mechanisms (Glover et al 2008). For example, when holding a community meeting about a potential development, the focus is always on economic costs and benefits rather than on the development's impact on community structure and relationships. Although decisions made in this fashion are perfectly adequate for its very narrow scope, the broader needs and desires of the community and its individual members are mostly ignored. Therefore, the aim of this dissertation is to build a broad decision framework that would assist the policy makers, community leaders, community members, and stakeholders to better understand and grasp the conditions and the opportunities presented by the boom, the challenges and barriers that inhibit nurturing communities, and outline the solutions necessary to achieve the community development potential created by the boom's economic activity.

General lessons learnt from North Dakota would be useful in other rural areas in Pennsylvania, Kansas, Colorado, Arkansas, and Montana currently experiencing unconventional oil and gas development. Perhaps more importantly, the experiences in North Dakota hold great potential for creating and developing an adequate community decision and planning framework

for these additional areas. There will be differences, but there are sufficient parallels in the landscapes, communities, and technology to justify broad inferences.

This dissertation consists of five studies, which are presented as independent articles or chapters. The chapters are interrelated and interdependent in terms of the issues they address and how the findings of each chapter relate to each other. As the first step of building a decision framework, it is important to understand the values of western North Dakota community members and how those values influence the attitudes towards rapid shale oil development. Therefore, the aim of the first study (chapter 2) is to identify and explicate the relevant rural community values in western North Dakota and the concomitant attitudes towards rapid energy development. Such an analysis would assist in the development of community policies and strategies with greater community acceptance, which would eventually improve resident's quality of life (QoL) and preserve the way of life in western North Dakota. Rokeach (1973) argues that values are indicators of the desired QoL, which is an important consideration in community decisions. Therefore, a detailed discussion of community values and attitudes towards the boom will set the context or foundation for understanding the effect of the oil boom on QoL of community members.

The second study (chapter 3) focuses on the impact of the oil boom on QoL of community members in western North Dakota. Impacts of rapid energy development affect stakeholder groups in many different ways based on several factors. These differential impacts generate important implications for QoL perceptions of the stakeholder groups. A thorough understanding of different QoL perceptions of different stakeholder groups would enable development of strategies that aim to improve the QoL of stakeholder groups that are negatively

affected by rapid energy development. Therefore, the aim of the second study is to understand the effect of the oil boom on QoL of different stakeholder groups in western North Dakota.

A community is made up of assets and community stakeholders. Certain assets of the community members, in terms of education, skills, and health are represented through certain assets of human capital. But a thorough discussion of the effect of rapid shale oil development on a community must analyze the impact of the boom on the community assets and the stakeholders. The third (chapter 4) and fourth studies (chapter 5) address these issues in detail. The third study presents a systems framework (socio-economic system) to build a broader understanding of how the changes or impacts associated with a boom manifest through juxtaposition of the goals and needs of community stakeholders, interactions of the community stakeholders, and the micro and macro conditions surrounding rapid oil development. The aim of the study is to demonstrate that longitudinal changes of a boom manifest through the interactions, interrelationships, and interdependencies that exist between stakeholder groups and other contributing conditions. As a result, the socio-economic system establishes a broader understanding to facilitate community development, planning, and policy formulation during an energy boom.

The aim of the forth study (chapter 5) is twofold. First, is to build an understanding of how the capitals interact and affect each other during a period of rapid energy development. It aims to examine the notion of "spiraling-up"[2] in order to build an understanding of how interactions and relationships between capitals could be better utilized to construct community development strategies, during a period of rapid socio-economic change. Second, the

[2] Presented by Emery and Flora (2006)

Community Capitals Framework (CCF),[3] which focuses on assets within a community, has never been used to understand the changes and potential community development strategies, during a period of rapid energy development. As a result, the study presents a novel way of looking at community changes and impacts during a period of rapid energy development, through its focus on two communities in western North Dakota.

The findings of second and third studies highlighted that the rapid growth in population generated a swift increase in demand for essential services such as law enforcement, education, health services, and city/county services. The increased demand for essential services created an urgent need to recruit more employees. However, recruitment remains an enormous challenge because of the lack of adequate and affordable housing. As a result, the fifth study (chapter 6) aims to study and analyze: (1) housing options available for essential service workers (teachers, law enforcement officers, nurses, public service employees); (2) whether the housing options available are affordable (or not) and if not affordable to what extent; (3) what are the tools and mechanisms available to improve affordability of housing for these groups; and (4) housing policy implications. Figure 1 summarizes the interconnection between the five studies.

[3] Presented by Flora and Flora (2013)

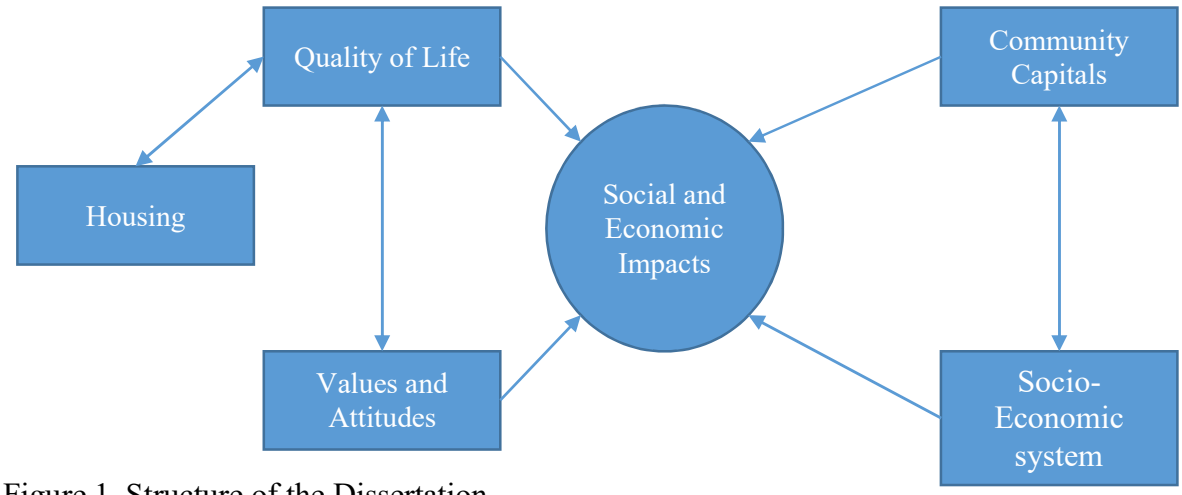

Figure 1. Structure of the Dissertation

1.2. Overall Methodology

The geographic area of the study was defined as the 21[4] oil and gas producing counties in western North Dakota, as outlined by the ND Association of Oil and Gas Producing Counties. Figure 2 presents the map of the counties. The data for the dissertation was gathered through a total of 210 in-depth, semi-structured, and open-ended, questionnaire based face-to-face interviews and first-hand observation of behavior and interactions. Participants include members from all four stakeholder groups: oil industry, public services, non-oil service industry, and community. When needed to ensure adequate information gathering, the original questionnaire was reshaped and fine-tuned as the interviews progressed.

The interviews of the first three studies were conducted during June and August 2013, while the interviews of the last two studies were conducted during May and August 2014. Field notes were taken to understand the setting and context of the interviews. Participants were recruited using several methods: (1) key community informants identified during pre-study

[4] At the time of the study the county count was at 21. However, later the number of oil and gas producing counties were reduced to 19.

efforts; (2) university extension service in western North Dakota; (3) personal acquaintances of friends and family; (4) snowballing off of participants in the study or chain/referral sampling. The study population was left unspecified and interviews continued until reaching a saturation point at which no new information was forthcoming. Probes were used whenever necessary.

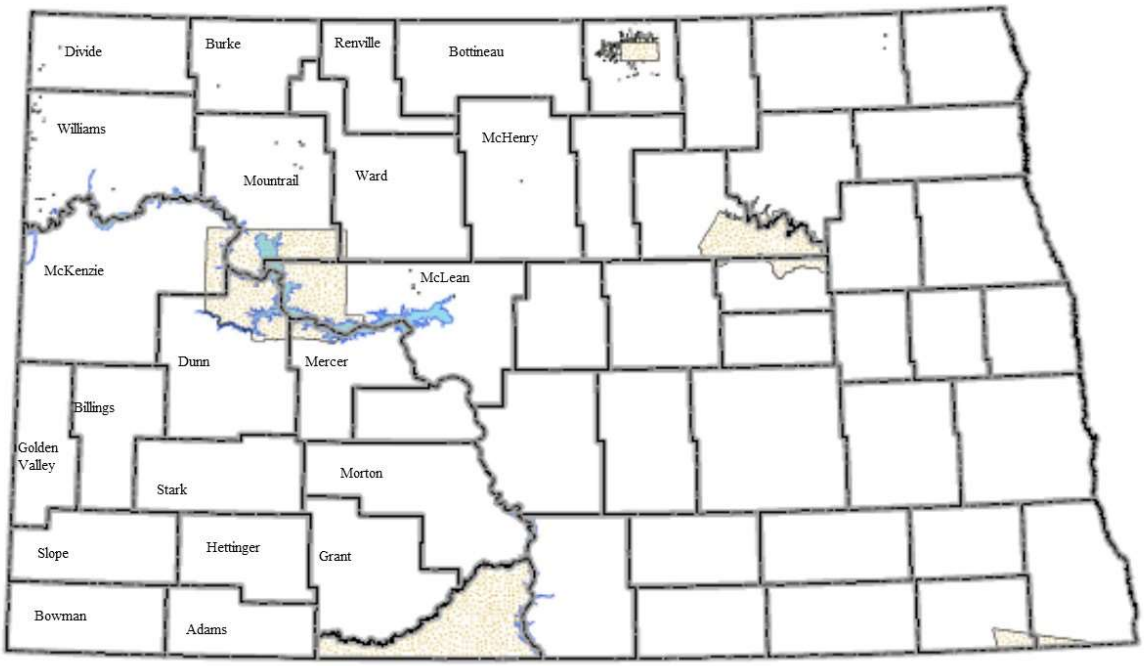

Figure 2. Map of Oil and Gas Producing Counties in North Dakota
Source: ND Association of Oil and Gas Producing Counties

The interviews were transcribed and then analyzed using qualitative/ inductive coding and analysis methodologies. Coding was done at two levels: open coding and thematic coding. Open coding is concerned with identifying, naming, categorizing and describing phenomena in the data. Open coding involves a type of microanalysis or a process through which a set of codes are created to indicate certain meanings (Strauss and Corbin 1990). At the secondary level, thematic coding involves identifying sections of data that are linked by a common theme in a way that facilitates the development of a framework of thematic ideas about the issue under focus (Gibbs 2007).

1.3. Ethical Issues

Institutional Review Board (IRB) approval was obtained and the data collection/ interviews were conducted within the IRB defined code of ethics, in accordance with research guidelines involving human subjects. Participant consent was obtained at the beginning of the interview and the interviews were audio recorded with participant consent. Participants were encouraged to express their ideas and thoughts freely with guaranteed anonymity. There was no major risks from the study to the participants. Once the data was transcribed, all identifiers and personal information were removed and such were replaced with numerical codes.

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2. RESIDENT ATTITUDES TOWARD OIL FRACKING IN RURAL NORTH DAKOTA: THE ROLE OF COMMUNITY VALUES IN ATTITUDE FORMATION

2.1. Abstract

Oil development can bring great reward to a community with greater opportunity, but also poses challenges to longtime community members, policy makers, businesses, and newcomers. Key to solving these challenges in a way that maximizes stakeholder interest is identifying the various values and attitudes of the stakeholders towards development. This chapter explicates the community values and the concomitant attitudes, their interconnections, and their groundings in a detailed manner that provides a broader understanding of community values in a rural setting and how a transformative event such as an oil boom affects such values.

The community values are organized, analyzed, and presented as a conceptual model under three of the most frequently researched place theories: sense of place/community, attachment to place/ community, and dependence on place/community. The findings clearly provide qualitative evidence to show that attitudes emerge on the basis of one's perceived expectations or evaluations about how an attitude object or development affects the particular things that people value. Implications of community values and attitudes on community planning and decision making are discussed. Findings of this study suggest three implications for shaping community strategies. From a value based perspective western North Dakota communities need to develop strategies to: (1) improve feeling of safety and security through investment in public services; (2) establish and enhance social support groups; and (3) enhance sense of unity and togetherness through better community integration strategies.

2.2. Introduction

Western North Dakota was once characterized by small rural communities and agricultural based rural way of life. But the 2005-7 oil drilling resurgence has instigated a full scale oil boom, which has significantly changed the nature and context of these rural communities (Bangsund & Leistritz 2011). A rapid influx of people into a community, as in the case of western North Dakota, often disrupts the established behavior patterns and affective bonds (Gramling & Brabant 1986, Higgins 2001). Survey of boomtown sociology, social disruption hypothesis, and social impact assessment literature shows that communities which undergo unconventional energy development generally experience negative consequences in addition to positive impacts (Chambers 1933; Cortese and Jones 1979; Wilikinson et al. 1982; Freudenburg 1984; Krannich and Greider 1984; Schmitz 1995; Brown et al. 2000; Besser et al. 2008; Anderson and Theodori 2009; Brasier et al. 2011; Ruddel 2011). As a result, to understand the social impacts of oil development on communities in western North Dakota, we must understand the impact on social structures, norms, and values etc. and how the community stakeholders relate to these (Brown et al. 2000, Freudenburg 1986).

Thompson and Blevins (1983) studied attitudes towards energy development in the northern Great Plains and identified three attitude dimensions toward energy development: (1) positivity towards economic opportunities provided by development; (2) expectations of social changes because of mineral development; and (3) concern about the environment. These attitudes are instructive in that they point to where the community's values can be found. One significant drawback to the study was that it did not delve into factors or what undergirds such attitude formation. It is our contention that the attitudes are based on community values, and as such it is important to recognize the values to understand the attitudes.

Values are important for understanding various social-psychological phenomena. First, shared community values are narratives that inextricably link people to place (Glover et al. 2008). Baxter et al. (1999) contended that disruptive events can shake people's sense of security in their ways of life when the events threaten the very nature of what these individuals value and expect from their community. As a result, the way residents define community values and describe their physical surroundings and social relationships act as a lens through which a certain event or development is interpreted (Baxter and Greenlaw 2005). Therefore, navigating and envisioning a path toward better communities inevitably require information about what communities' value and how those values shape attitudes and even potential behavior towards an oil boom (Kasperson and Kasperson 1996, Cross 2001).

Second, values are indicators of the desired quality of life, which is an important consideration in community decisions (Rokeach 1973). Perdue et al. (1999) identified a significant relation between resident attitudes and perceived quality of life: the more positive attitudes residents have if they think that their lives have greater quality and vice versa. Therefore, understanding community values and attitudes have important implications for understanding the quality of life changes in the community during a period of rapid social transformation.

Third, although desires for improved economic conditions drive development, the success of community decisions and choices for development should be gauged by how well the needs of community members are served (Park & Stokowski 2008, Smith et al 2011). Mullin and Gottschalk (1973) contend that the ultimate step in knowing a community is the ability to perceive the world as the various groups and sub-groups of members within the community perceive it. For example, understanding attitudes and perspectives of community members and

areas of agreement and disagreement towards development is crucial in order to help preserve the unique way of life while continuing economic improvement and social betterment in rural areas to facilitate an acceptable future for all residents of the community (Wilmot 2009, Chang 2010). Therefore, the aim of this chapter is to identify and explicate the relevant rural community values in western North Dakota and the concomitant attitudes towards rapid energy development. Such an analysis would assist in the development of community policies and strategies with greater community acceptance, which would eventually improve resident's quality of life and preserve the way of life in western North Dakota.

This chapter is organized as follows. The literature review section defines the theoretical framework and outlines the study's concepts. Three concepts that have dominated place theory: sense of place (SOP), attachment to place (ATP), and dependence on place (DOP) are used to differentiate, contrast, and organize the heterogeneous community values. The methodology section discusses the methodological approach adopted. The results section presents the constructed figures and explicates each community value theme. The discussion section focuses on the implications of findings on community planning and development, comparison of the findings with other studies, limitations of the study, and directions for further research.

2.3. Review of Literature

The review of literature is organized into three sections. The first section outlines what are attitudes and values within the scope of this study. The second section summarizes the place conceptions used in this study. Since places conceptions such as SOP are widely researched topics, the body of literature is vast and varied. As a result every aspect of place conception cannot be discussed within the scope of this chapter. Therefore, focus of the review is to outline what each place conception means and represents within the scope of this study. The third

section reviews and summarizes literature that have focused on attitudes and values during a period of rapid social change.

2.3.1. Attitudes and Values

Attitudes are evaluative learned predispositions, stances, tendencies, or positions one takes vis-a-vis the world, towards a particular entity, exogenous event, or stimulus that expresses favorable or unfavorable views (Allport 1961, Rokeach 1973, Tuan 1974, Eagly & Chaiken 1993, Rohan 2000, Ajzen & Fishbein 2005). All attitudes, predispositions, or stances must rely on some sort of basis to direct the attitude to some object and give it a negative or positive connotation. Allport (1961) views values as a belief upon which a man acts by preference.[5] A value is an enduring belief, standard (guiding principles), or implicit analogical principle that a specific mode of conduct (about what is good, desirable, or preferred) or end state of existence is personally or socially preferable to an opposite or converse mode of conduct or end state of existence (Rokeach 1973, Schwartz 1994, Miller & Besser 2000, Rohan 2000). For example Danbom (1996) claims that people value rural America because it is not urban America. Therefore, certain characteristics that differentiate rural America from its urban counterpart constitute why rural America is valued. These characteristics might include serenity, quietness, or vista, which are not in and of themselves valuable for their own sake. But if these characteristics are believed to be important to the way of life of the people concerned and represent such way of life, then they become values as they are reified by those holding them as values.

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[5] Review of other literature such as Bergstrom (2012), Rohan (2000), and Schwartz & Bilsky (1990) also reveals this analogy.

Stern and Dietz (1994) describe attitudes as constructed through a long succession of experiences in which individuals attempt to take account of their values within a value expectancy calculus that economizes cognitive effort. Consequently, attitudes are presumed to emerge in a relatively straightforward way on the basis of one's perceived expectations or evaluations about how an object or technological development (such as energy development) or other attitude object affects the particular things one values, based on the information they receive (Allport 1961, Tuan 1974, Freudenberg & Jones 1991, Stern & Dietz 1994,Couch & Kroll-Smith 1994).

This study's focus is on the community values rather than on those of individuals. Individuals vary in their personal values[6] and priorities based on personal circumstances, but community members share certain values or beliefs that provides the community with a sense of solidarity, pride, and distinct identity, which allows it to delineate itself from other communities. Therefore, it is important to understand how people reconcile what they want with what others want and as a result how shared community values emerge (Rohan 2000).

Community values are an aggregation of common individual values that represent meanings, dependencies, and attachments to the community (Miller and Besser 2000).[7] In a

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[6] Schwartz (1994, 1996) and several others identify ten different types of personal values based on motivational goals that represent form-of-conscious goals on three universal requirements of human existence to which all individuals and societies must be responsive: needs of individuals as biological organisms, requisites of coordinated social interaction, and requirements for the smooth functioning and survival of groups (Schwartz & Bilsky 1990, Sagie & Elizur 1996, Schwartz & Boehnke 2004).

[7] It is important to highlight that in the context of this study values have no economic connotation or valuation aspect attached so that when we refer to a certain value it does not represent economic concepts as peoples "willingness to pay" towards such. Values represent principle beliefs, and the attitudes of participants are based on these non-economic values.

community context, sense of community (SOC), attachment to community (ATC), and dependence on community (DOC) are predicated on underlying values that members collectively hold towards their community. The prioritization of values develop through interaction among community members, and as a result, a community develops commonality in its values, although there will never be perfect agreement between all community members as to what these values are in particular (Dietz et al. 2005). Subsequently community values are: (1) shared common grounds for community members; (2) serve the interests of the community members; (3) define the community character and identity; (4) can guide action giving it direction and emotional intensity; (5) shape the choices and decisions that members make as a community; and (6) function as standards or frames for judging and justifying decisions and action. Therefore, community values refer to those values the members of a community share that transcends personal value agendas and brings together the members of the community such that the members can meet their needs through the resulting community experience (Schwartz 1994, 1996, Hitlin & Piliavin 2004, McMillan & George 1986, Rippl 2002).

2.3.2. Conceptions of Place

This study focuses on three place constructs popularized by contemporary place theory: sense of place (SOP)/community (SOC); attachment to place (ATP)/community (ATC); and dependence on place (DOP)/community (DOC). [8] A review of literature shows considerable overlap, similarities, as well as differences among these different terms, resulting in ambiguous or vague uses. As a result, there is a strong need to clearly outline what these concepts mean in the context of this study.

[8] Other concepts such as place identity (Jorgenson & Stedman 2001), place satisfaction (Stedman 2002, McMillan& Chavis 1986), place embeddness, and place belonging also have been cited.

SOP is a complex multidimensional construct of a spatial setting by a person or group (Tuan 1974, Proshansky 1978, Kaltenborn 1998, Stedman 1999, Jorgenson & Stedman 2001, Hrast & Dolnicar 2011). Review of literature shows that SOP can be defined as: (1) consciousness of one's physical surroundings (Allen 1990); (2) socially constructed collection of subjective beliefs, values, or place meanings of relationships between self and place (Stedman 1999; Kaltenborn 1998); (3) the resulting attitudes or evaluative perspectives (Stedman 1999); and (4) ongoing distinctive interpersonal interactions and social behavior of the place in relation to alternatives (Jorgensern & Stedman 2001, Knez 2005). SOP is often treated as an umbrella concept containing other place concepts such as ATP and Place Identity (PI) (Kaltenborn 1998). Careful study of Stedman (2002) and Proshansky (1978) shows how close and analogous SOP and PI are constructed and viewed.[9]

Sense of community (SOC) as SOP additionally encompasses feeling of membership or belonging and pride (McMillan & George 1986, Miller & Besser 2000, Uzzell et al. 2002, Hrast & Dolnicar 2011). SOC is described in how residents explain their social contacts and relations with neighbors[10] and connotations of the surrounding physical environment and built landscape features (Green 1999, Uzzell et al. 2002). Concerns about SOC are often articulated in debates about preserving community identity during periods of social transformation. These debates often surpass the economic well-being issue and include such topics as quality of life and the ways of life that are changing (Stedman 1999).

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[9] This association can be noted in other works as well (Kyle et al 2004, Miller & Besser 2000, Knez 2005, Uzzell et al. 2002).

[10] Ties with one's neighbors, trust and general feelings about neighbors, instrumental ties in the neighborhood, participation in neighborhood organizations.

Attachment to Place (ATP) is a broader affective or emotional bond characterizing the individual's relationship to the place and expressed through the individual's desire to maintain closeness to that place (Williams & Roggenbuck 1989, Jorgenson & Stedman 2001, Cross 2003, Hrast & Dolnicar 2011). As a result ATP fosters place-protective behavior towards social and environmental conditions (Kyle et al 2004), especially when important symbolic meanings and perceptions are threatened by change (Stedman 2002). ATP encompasses both a feeling that members matter to one another and to the group on an emotional connection of commitment and a belief that members have shared and will share memories, similar life experiences, common places, and time together (Tuan 1974, McMillan & George 1986, Knez 2005).

Wilmot (2009) found that a high level of Attachment to Community (ATC) was one of the major factors influencing residents' attitudes. ATC is predicated on a clearly expressed set of values that dictate how individuals link and relate to the community (Cross 2001). ATC is often measured by three variables: (1) personal context of identity, e.g. "I'm a rural North Dakotan" or "I'm from a big city;" (2) feeling sad about moving; and (3) concern and interest in what happens in the community (Cross 2003, Raymond et al. 2010). People feel attached socially (social relationships with friends, family, local groups and organizations) as well as to the physical dimension (natural environment or built environment) of places (Hidalgo & Hernandez 2001, Raymond et al. 2010).

Dependence on Place (DOP) involves the goal-oriented behavioral component of place conceptualization. DOP or in this case Dependence on Community (DOC) delineates how residents view the quality of the place or the ability of the place to meet a set of objectives, goals, or needs of the community members, compared to other alternative places (Stokols and Schumaker 1981, Pretty et al 2003, Williams & Vaske 2003, Jorgensen & Stedman 2006). Pretty

et al (2003) considered factors such as economic viability or the opportunities provided by the community as one of the main factors representing dependence. Stokols and Shumaker (1981) outlined DOP as a two factor construct. The first factor relates to the quality of the place, whereas the second factor relates to the relative quality of the place compared to alternative places. Since this study focusses only on western North Dakota as a community, the latter factor is not addressed here.

Mesch and Manor (1998) argue that ATC results from a positive perception of the community and its environment. Community members evaluate community characteristics using subjective standards and judge the advantages and disadvantages provided by the physical and social environment. Therefore, ATC seems strongly related to DOC (Mesch & Manor 1998). To this end White et al. (2008) identifies DOP as a functional attachment to a place to meet a set of needs. Williams & Vaske (2003) assert DOP as a subset of ATP, which represents the functional attachment that signifies the potential of a place to provide certain features and conditions that support specific goals and activities.[11] It can be agreed that attachment comprises of both emotional and functional dimensions. Therefore, ATP is considered to refer to the emotional or affective attachment to place and DOP represents the functional attachment to place.[12]

Summarizing all of the above, SOC, ATC, DOC are viewed as separate but interrelated and interdependent concepts, which form a multidimensional construct of place. Jorgensen and

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[11] The other subset of ATP in the study is outlined as place identity which represents the emotional attachment to place. But review of literature under SOP clearly shows how other researchers have used analogous constructs of SOP and Place Identity. Therefore, within the scope of this study Identity is treated as analogous to SOP, or the cognitive construct of place.

[12] Such conceptualization is consistent with other studies such as Kostanski (2011), Farnum et al (2005) and Pretty et al (2003), which views DOP as a functional attachment that describes the reliance on the characteristics of a place to provide certain opportunities, resources, or satisfaction of needs.

Stedman's (2006) study showed strong evidence that while some variation was unique to each place construct (between ATP, DOP, and PI) there is a large degree of overlap among the constructs at the empirical level. The study differentiated between the three concepts based on the considered variables whether it is primarily affective (attachment), cognitive (identity) or conative (dependence). This study views SOC, ATC, and DOC to be of a similar construct: SOC is the cognitive domain in which meanings that represents how members feel and think about the community are established; ATC is equated with the affective (or emotional) component of attitudes that represents factors which ties members to the community; and DOC represents the conative domain of attitudes on how community member needs are met through the community (McMillan & George 1986; Kaltenborn 1998; Jorgenson & Stedman 2001; Pretty et al. 2003; Bergstrom 2012).

2.3.3. Impacts/Changes of Rapid Energy Development

Various impacts of rapid energy development has been explicated under a plethora of studies that fall under fields such as "social impact assessment,"[13] "social disruption hypothesis/theory,"[14] and "boomtown" literature. Energy development generates many positive economic benefits in the form of increased jobs, higher pay, overall economic prosperity, tax revenues, more services, new economic opportunities for local businesses and landowners (mineral and lease rights owners), and influx of young people (Murdock and Leistritz 1979;

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[13] A field of social science and a component of the policy-making process. Social impact assessments are generally anticipatory efforts to project likely impacts before they occur but empirical work has looked at a broad range of social and cultural impacts. The purpose of SIA studies is to assess the impact of what a project is doing or might do in the future on the QoL in the community (Freudenberg 1986).

[14] Social disruption theory states that communities experiencing rapid growth typically enter a period of generalized crisis and loss of traditional routines and attitudes (Park & Stokowski 2008).

Reynolds Jr et al. 1982; Anderson and Theodori 2009; Christopherson and Rightor 2011; Brasier et al. 2011; Ladd 2013; Measham and Fleming 2014).

Rapid energy development creates several logistical challenges or impacts such as increased strain on local infrastructure including roads and housing; overwhelmed public services including health, education, and emergency services (Anderson and Theodori 2009; Jacquet 2011; Schafft et al 2014); traffic issues, accidents, and other safety concerns; increase in cost of living (Jacquet 2011; Brasier et al. 2011); and lack of affordable housing and concomitant outmigration of longtime residents living in rental housing- mostly seniors or others on fixed incomes (Williamson and Kolb 2011). The social impacts of energy development are centered around noise[15] (Ladd 2013); increased levels of antisocial behavior, disorder, and crime (Reynolds Jr et al. 1982; Ruddel and Ortiz 2014); impacts to the rural landscape or biophysical environment[16] (Alter et al. 2010); impacts on social networks and relationships (Murdock and Leistritz 1979); and lack of newcomer integration into the community (Ford 1977). Freudenburg (1986) concludes that additional social impacts can occur if new employment opportunities attract enough job seekers to lower the community's density of acquaintanceship, or the proportion of residents who know one another, thereby lessening the effectiveness of socialization and deviance control.

Stedman et al. (2012) examined the resident behaviors, beliefs, and attitudes of New York and Pennsylvania residents, within the Marcellus region. Pennsylvania had seen active

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[15] As it disturbs the peace and quiet nature of the surroundings.

[16] Rural people develop deep bonds towards their environment. During a study by Alter et al. (2010) participants expressed concern about the impacts on the landscape, and relatedly, their desire to live in the area. For many, the rural nature of these areas is the reason they live where they do and they feared that energy development would permanently degrade the amenities and rural QoL they've come to appreciate (Alter et al. 2010).

drilling for three years prior to survey administration and New York had not experienced any drilling. As a result, the researchers suspected that Pennsylvania respondents would express more certainty about impacts. That's not what the study revealed. New York residents were more opposed to development and characterized the industry in a more negative light. New York residents also differed significantly compared to their Pennsylvania counterparts, in their expectations of change for relatively few elements: impacts on overall quality of life, the quality of the natural environment, and recreational opportunities. In each of these cases, New York residents were more likely than their Pennsylvania counterparts to anticipate that development of the gas industry would negatively impact these aspects of community life (Stedman et al. 2012).

Kriesky et al. (2013) contends that major support for gas drilling comes from individuals who stand to profit through mineral rights leases; those who otherwise believe that this form of energy extraction is an economic opportunity; and those who believe the threats to the environment and public health are minimal (Kriesky et al. 2013). Similarly, Jacquet (2012) contends that attitudes toward natural gas development is highly dependent on environmental attitudes and industry leasing, development, or employment experience. Landowner compensation or experience with an energy company appeared to be a much larger influence than proximity on resident attitudes. Reducing the perceived and actual environmental impact of energy development, while increasing the economic impact perceived by all residents in the community, will help to gain community support of landowners not affiliated with energy development (Jacquet 2012).

Disruption to social-psychological values such as attachment and place based identity may drive oppositional behavior to energy development (Jacquet and Stedman 2014). Jacquet and Stedman (2013) examined the landowner perceptions from extensive natural gas drilling in

an area of northern Pennsylvania. Impact perception was found to explain a large portion of residents' overall attitudes toward the energy development, and residents' place meanings for the area also explained some attitudinal variation. Factors such as place attachment and length and type of residency were found to have little or no effect on either the perception of impact or resident attitudes toward development (Jacquet and Stedman 2013).

Changes in community size or nature may affect the place meanings, community perceptions, and social interactions (Freudenburg, 1986; Krannich and Greider, 1984). However, Berry et al (1990) found that change in community size or scale does not inevitably result in changes in local social interaction patterns. As a result Berry et al. (1990) contend that integrative social ties linked to interactions among neighbors can provide an important locus of stability in the context of rapid community change.

Devine-Wright and Howes (2010) contend that contradiction between development and place is experienced as a threat to identity for those with strong place attachment, leading to negative attitudes and oppositional behavior. Brehm et al. (2006) studied two distinct dimensions of community attachment: (1) socially based attachment, and (2) attachment to a community's natural environment. Findings indicate that the two dimensions of attachment are distinct, and that they relate differently to environmental concern. When social attachment dimension was a statistically significant predictor of attitudes towards local environmental issues, the issues were representative of community culture, identity or health. When natural environment attachment was a statistically significant predictor of local environmental concern, the concerns reflected issues involving resource protection (Brehm et al 2006).

Brown et al. (1989) examined impact of rapid energy development on community satisfaction and attachment. The results suggest that some changes indicative of social disruption

did occur during the period of rapid growth. In addition, there was little evidence that satisfaction or attachment recovered to pre-boom levels during the subsequent bust phase of the growth cycle (Brown et al. 1989). However, in a later study Brown et al. (2005) found that three of the four subjective indicators of community satisfaction and social integration returned to or exceeded pre-boom levels within approximately a decade of the boom period.

Rural communities are, by and large, surprisingly homogeneous and relatively conservative in both their value orientations and their interpretations of these values. Rural values may change as the communities modernize or industrialize as a result of rapid energy development (Little 1977). A better understanding of resident perceptions of energy development and the underlying values will become critical in the effective planning and siting of these projects, especially in areas that offer a mix of landowners who are under lease and who are not affiliated with the development (Jacquet 2012).

2.4. Methodology

The purpose of this study is to understand the oil boom's effect on community values in western North Dakota and transpiring attitudes towards the boom. The geographic area of the study was defined as the 19 oil and gas producing counties in North Dakota as identified by the ND Association of Oil and Gas Producing Counties.

Since community values and attitudes are contextual and are bound in the space and nature of the setting, a methodological approach that provided the flexible adaptability needed to identify the community values and attitudes was required. Many previous place-based research provided guidance in devising and shaping the methodology. Jorgenson & Stedman (2001) outlined that an attitude-based exploration should include (1) an overall evaluation of the setting; (2) descriptive cognitions about the setting; (3) behavioral intentions associated with the place;

(4) the quality of the attitude-object relationship characterized by the various dimensions of attitude strength. The first two criteria are addressed in this study. The last two aspects which might require a more quantitative based methodology were left as opportunities for further research.

In order to gain a fundamental and preliminary understanding of the setting, documentary or content analysis was undertaken as a preliminary effort. Evensen et al. (2014) adopted a similar content analysis of four local newspapers to examine social representations of environmental, economic, and social impacts of natural gas development in the Marcellus Shale. The *Williston Herald* is one of the premier and widely read local newspapers in the area. In addition to the print edition, the paper is online, thereby enhancing its availability, accessibility, and readability. Online visitors to the paper's website can express their views, concerns and reactions to the articles through the comment sections. 512 letters to the editor, published during the period 01/01/2010 to 12/31/2012, as well as 3,877 online comments made by anonymous visitors on opinion articles were manually coded and analyzed. This preliminary effort provided guidance to: (1) designing and developing of study's questionnaires; (2) identifying key informants and prominent people in the community as potential participants; and (3) building a preliminary understanding of attitudes and values in the context of western North Dakota. For example,

> "The core of our towns is being lost because the locals simply don't want to live here anymore. They are leaving because the home they knew and loved is no more. They are leaving because they have lost their cherished lifestyle, their peace of mind, their safety — they have lost their western North Dakota. Those who had a connection to the land and loved it for all its natural beauty will understand what I'm talking about. I have

> discovered that many people from other areas do not relate to our fondness for solitude, wide open spaces, waving grass on rolling prairie hills and the quiet still darkness punctured by a coyote's howl, the hoot of a great horned owl or the whistling wings overhead from flocks of migrating ducks."[17]

Letters to editor and comments such as the above helped build a preliminary understanding of what residents in western North Dakota value and how they have been affected by the oil boom.

Data for this study was gathered through 89 in-depth, semi-structured, and open-ended, questionnaire based face-to-face interviews and first-hand observation of behavior and interactions. The questionnaire was reshaped and fine-tuned as the interviews progressed. Each interview lasted between 1.0-1.5 hours, and were conducted during June-August, 2013. Field notes were taken to understand the interviews' setting and contexts. Table One summarizes the characteristics of the study participants.

Participants were recruited using several methods: (1) key community informants identified during pre-study efforts; (2) extension service in western North Dakota; (3) personal acquaintances of friends and family; (4) snowballing off of participants in the study or chain/referral sampling. The study population was left unspecified and interviews were continued until reaching saturation or the point at which no new information was forthcoming. Probes were used whenever necessary. Participants were encouraged to express their ideas and thoughts freely with guaranteed anonymity during the participant consent process. The

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[17] Ventsch, S. 2012. It's not a Matter of if something Happens, But When. *Williston Herald*. Posted online, 4, December 2012.

interviews were transcribed and were analyzed using qualitative/inductive coding and analysis methodologies.

Table 1. Characteristics of the Study Participants

Description	Number	Description	Number
Gender		Occupation	
Male	48	Public Service[1]	14
Female	41	Non-oil service[2]	11
Age		Oil Industry or associated industry	24
60+	16	Retired	4
30- 60 years	54	Owns a business	8
20-30 years	19	Not employed[3]	7
Residency		Farming and ranching	18
Longtime	44	Other[4]	3
New comer[5]	23	Housing Status	
Returning resident[6]	17	Own the house	46
Transient[7]	5	Living in a rented property	24
		Employee provided housing	11
		Living with family[8]	6
Owned mineral or lease rights	14	Other temporary housing[9]	2
Didn't own any rights	75		

[1]Education, law enforcement, city and county services etc.
[2]Retail, dining, recreation, health care etc.
[3]All the non-employed were females and wives/girl friends of oil field workers
[4] One pastor and two nuns
[5]Oil industry activity started to increase around 2005-6. As a result people who moved in to the community within the last 8 years were considered newcomers.
[6]A resident who was born/grew up in the area, moved away before the boom, and came back after the boom began. As a result, all these returning residents had family in the area.
[7]Were in the community temporarily.
[8]Parents living with kids or kids living with parents if they returned back to the community
[9]Hotel rooms used for living purposes

The inductive and qualitative data analysis method involved construction of a descriptive conceptual framework to make systemic sense out of the data. Therefore, a three-tier coding approach was adopted. Previous studies (Rokeach 1973, Tuan 1974, Proshansky 1978, Stokols & Schumaker 1981, Brandenburg & Caroll 1995, Stedman 2002), which are some of the most

widely cited place research, were used as a guideline for coding and organizing data. At the primary level, data was coded (structural coding/open coding) to organize data along the place based conceptions. Key words exemplifying cognitive, affective, conative expressions were used to organize data. At the secondary level, data was coded (thematic coding) to identify community values under each place conception. At the third level, data was coded to identify the impacts/changes caused by the boom on community values and the resulting attitudes. Data under each place conception were then assimilated to represent consistent and patterned themes, which led to the construction of figures presented under the findings. The findings and interpretations were checked with community members who were not participants of the interviews to ensure pertinence and validity.

2.5. Findings

A total of 10 major community value themes emerged that represent and undergird the way of life and attitudes of residents in western North Dakota towards the oil boom. These major value themes are made up of 24 underlying community values (figure 3). Some values influenced several major value themes, which indicates the interrelated nature of SOC, ATC, and DOC. For example, density of acquaintance is a community value that influenced sense of unity and togetherness (which was a major community value theme under SOC) and safety and security (which was a major community value theme under DOC). There are no common values between ATC and DOC, which indicates that within the context of this study ATC represents affective values and DOC represents functional values. Common values between SOC/ATC and

SOC/DOC show that the three place theories are interrelated and interdependent. The community values highlighted in bold are viewed with a negative connotation in life before the boom.

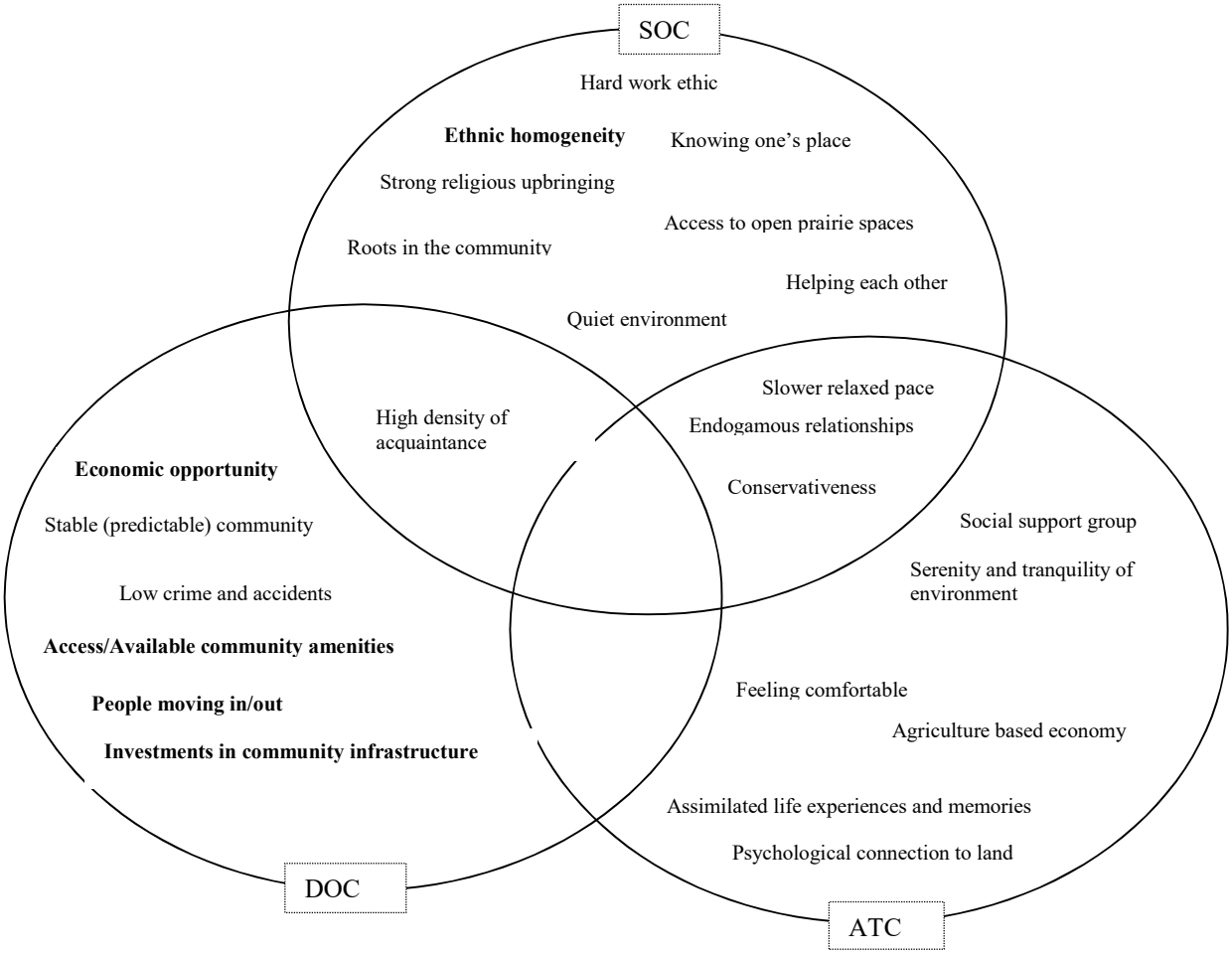

Figure 3. Community Values in Western North Dakota

The proceeding sections describe the respective major community value themes under each place theory and the community values that undergird each theme. It then identifies the changes/impacts caused by the boom that has affected each theme and whether the resulting attitudes are perceived as positive or negative. None of these value themes are independent. In fact, they are closely interrelated and interdependent.

2.5.1. Sense of Community (SOC)

Participants were broadly asked about how they describe life in western North Dakota before the boom and the important meanings in that way of life. SOC is made up of four major community value themes: sense of peacefulness and freedom, sense of unity and togetherness, sense of culture and ethnicity, and sense of belonging. Figure 4 summarizes the effect of the impacts created by the boom on community values and the resulting attitudes under SOC.

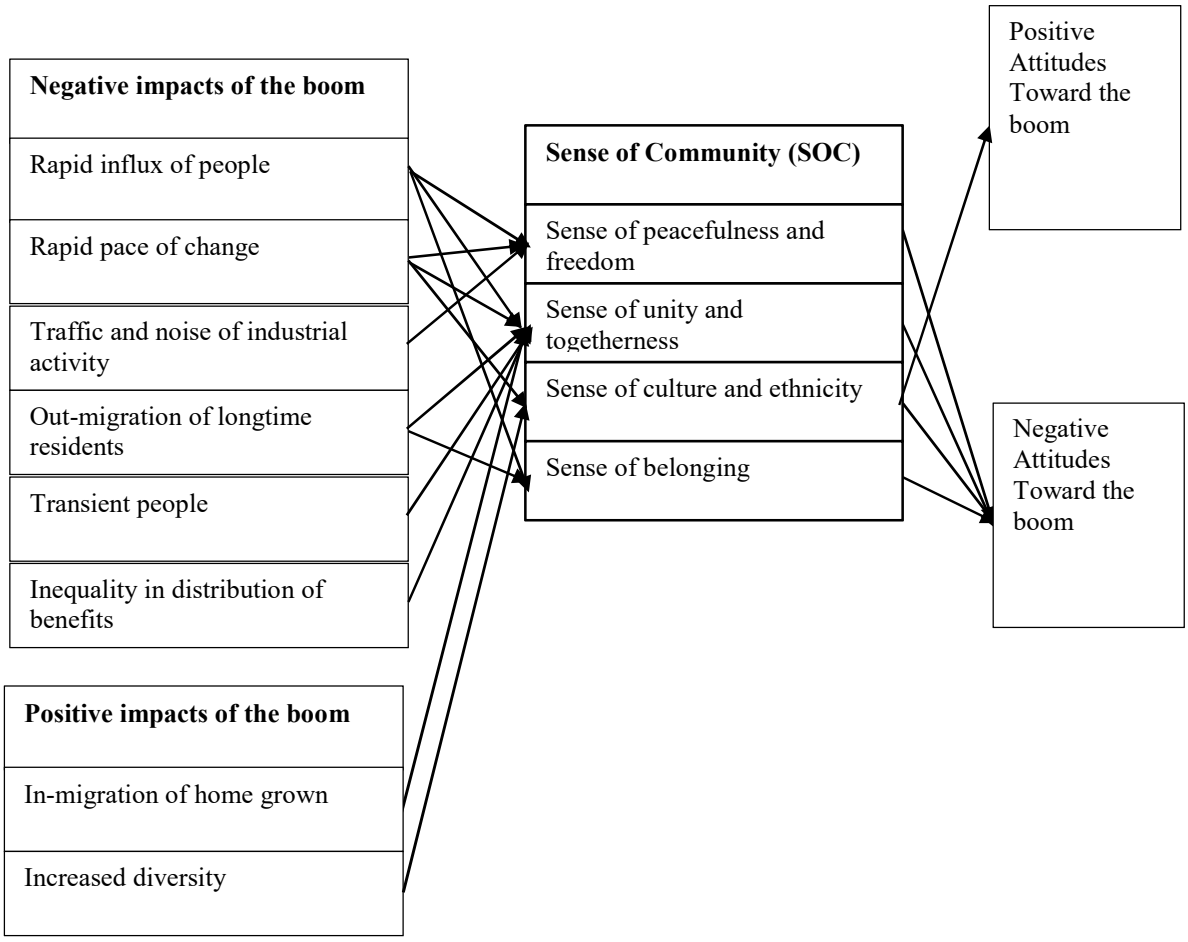

Figure 4. Effect of the Boom on SOC

2.5.1.1. Sense of Peacefulness and Freedom

Sense of peacefulness and freedom was articulated based on: quiet environment of the surrounding and the community, slower relaxed pace of life, and access to wide open prairie spaces. During a study conducted by Genareo (2013) examining the attitudes, perceptions, and reactions in a rural pre-boom North Dakota community, most participants indicated that their space was somehow affected due to the population influx. The study also found that residents valued the open space from the vast open fields to the lightly traversed roads. This study shows that such affect was perceived because people cherished the peacefulness and freedom facilitated by quiet, open spaces, and slower relaxed pace as one longtime resident described:

> "I think there is a quiet and peace to it that's personally important for me. I think that is engrained in us. We had much more freedom. You could go anywhere to find a place to be alone. So you got used to that and you didn't realize how beautiful it was or how much you miss it till it was gone."

Sense of peacefulness and freedom was perceived to be negatively affected by the rapid influx of people, rapid pace of change, and traffic and noise caused by industrial activity as indicated by another participant: "It was so quiet it's so nice everything was so laid back and now the whole atmosphere of the town feels different. Peace and quiet was more valuable than anything for me."

2.5.1.2. Sense of Unity and Togetherness

Sense of unity and togetherness is predicated on helping and caring for each other (especially during difficult cold winter conditions and agricultural based economy), integrated community (endogamous relationships), and knowing everyone in the community (high density of acquaintance), as one participant described: "people that reach out and care for each other,

that's always been a strong trait here. Just watching out for your neighbors and helping people in need in the community, that's always been something very proud to say." When asked what values the community cannot let go of, another resident noted: "neighbor helping neighbor, caring about your neighbor and caring about your community. Coz that's what a small town is. People helping people." The smaller size of community and high density of acquaintance facilitated social activities and bonding that brought people together. The rapid influx of people, rapid pace of change, outmigration of longtime residents, transient nature of people moving into the community, and inequality of distribution of benefits generated by the boom has negatively impacted the sense of unity and togetherness. However, in-migration of people who grew up in the area has positively affected sense of unity.

To further explicate these findings, mineral rights or lease owners, business owners, and landlords have considerably benefited financially from the oil boom. But not everyone in the community is in a position to benefit financially, which creates a certain discomfit in those residents who have to bear the costs of the boom without receiving any benefits. How inequality in distribution of costs and benefits affects the community was described by one participant:

> "I've seen it tear people apart. I've seen it tear neighbors and put animosity among them and neighbor against neighbor. We don't have community anymore. People judge each other I mean money does all soughs of things to you [oh he's got money] you know."

Out-migration of longtime residents create deep cleavages or gaps in the community fabric that fragments the community as described by another participant: "absolutely. It's the people that build the area, know the area, know the needs, know the people, so that core part of the community. They have moved on. It will be a void.

The transient nature of oil industry workforce does not provide opportunities for them to integrate into the community. People who have moved into the community with their families have not spent sufficient time in the community or do not have many opportunities to integrate and become part of the community as described by another participant: "there's just not been time to develop the friendships necessary to build trust with new people. It's so fast it's so rapid and it's so much." As a result, these changes have caused a negative impact on the sense of unity and togetherness

2.5.1.3. Sense of Culture and Ethnicity

Culturally influenced values (especially personal values) require a lengthy discussion as culture is one of the major determinants of values. Many personal values that were based on culture were expressed during the interviews. However, the focus of this study is on shared community values. Therefore, the discussion is limited to such. The important cultural based community values include: hard work ethic, conservativeness (simple basic community needs),[18] ethnic homogeneity, and strong Christian/Catholic (religious) upbringing. The communities in western North Dakota before the boom were largely homogenous. Almost everyone was Caucasian/White of eastern/northern European or Scandinavian descent, with a few Native American reservations proving the exception. The hard work ethic, conservativeness, and strong religious upbringing are viewed as positive values, while ethnic homogeneity or lack of diversity before the boom is viewed in a negative connotation as outlined by one participant:

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[18] Before the boom, communities in western North Dakota didn't offer much retail, restaurants, recreation or other community amenities to its members, which is typical in a small town. The grocery store, movie theater, and few shops were what was available and residents made do with what they had. Therefore, conservativeness is embedded in residents managing with what they had and trying to retain what they had.

> "I think one thing that we were lacking and are doing far better now is cultural diversity. We were 98.2% northern European Caucasian and we didn't have racial diversity we didn't have religious diversity we didn't have cultural diversity we really didn't. Now we are starting to experience that. With that has come different food choices that we didn't have before, different arts, and I remember being much younger and wanting those things, and now we have them."

The boom has attracted people from diverse ethnicities and cultures to the area. Most participants in the study viewed the diversity brought about by the boom as a positive impact.

2.5.1.4. Sense of Belonging

Sense of belonging constitutes: several generations of roots in the community, knowing one's place in the community, and strong social interconnections (endogamous relationships). When a person has several generations of roots in the community, most of his or her immediate or extended family is in the community, and strong roots generate acceptance and recognition, within well-established community circles in a small community, as one participant described:

> "You kind of sensed that you knew where you fit in within the community. Everybody kind of knew where they belonged in the community. It's kind of sense of knowing your place. Not close knit necessarily. But we knew where we belonged in a relationship to each other. Sense of bonding and we sought of knew our place."

Sense of belonging is a value theme closely tied to sense of unity and togetherness and attachment to community as a place of "home."[19] But examination of underlying values outline that cognitive sense of belonging is different from affective belonging, which is referred to as a

[19] Discussed under ATC

place of "home." The sense of belonging has been negatively affected by the rapid influx of people and outmigration of longtime residents.

2.5.2. Attachment to Community (ATC)

Participants were broadly asked about what factors they considered in the decision to live in the community and what kept them in the community. Four major community value themes emerged under ATC: attachment to social support group, attachment to rural way of life, attachment to community as a place of home, and attachment to surrounding environment. Figure 5 summarizes the effect of the impacts created by the boom on pertinent values and the resulting attitudes under ATC.

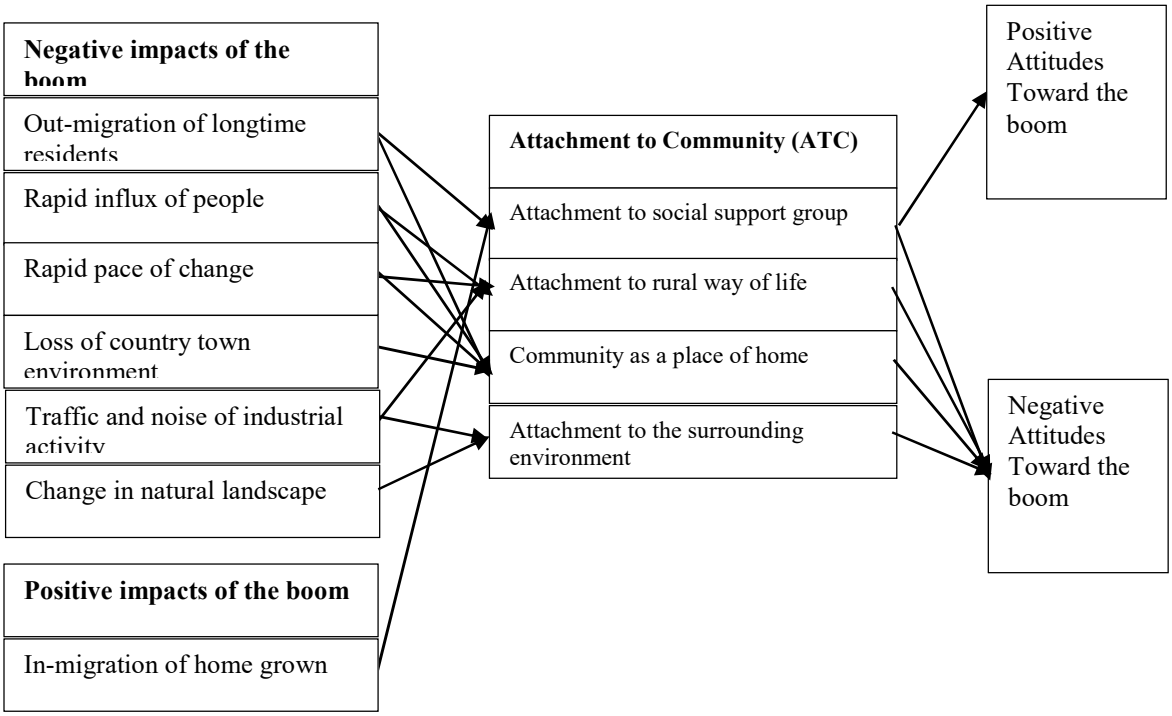

Figure 5. Effect of the Boom on ATC

2.5.2.1. Attachment to Social Support Group

The social support group comprises family members, friends, neighbors, and other established social connections. It is one of the major factors that ties people to the community that people value as evidenced by one resident:

> "I was born and raised here. For me, number one thing is my family is here: my mom my sister and my circle of friends. My group of friends are more like family. I lived in Minneapolis for few years. It was great, but every time I came home it was literally like a weight off my shoulders. It was just absolute security. Maybe it's that sense of knowing that whatever happens, I got a full support group of family and friends here for me."

The out-migration of longtime residents has negatively affected the attachment to social support group, while in-migration of the home grown has positively affected social support groups. Before the boom, many elderly parents especially living in farms/ranches or rural communities had to endure their kids moving away in search of better economic and life opportunities and not knowing whether anyone would come back to take over the family farm or ranch after them. Some of those children are coming back to the community in which they grew up; thereby, renewing the hopes in parents for continued family presence in the community, as described by one participant: "there really wasn't much for them here. But they're coming back in droves now. We have a lot of our friends where the kids have been away who are back. Our son is one of them." At the same time longtime residents have lost lifelong friendships and connections as many longtime residents have moved out of the community:[20] "oh certainly yea. A lot of the

[20] Detailed discussion of why longtime residents are moving out is presented in our other research work

people that we know, friends with them have moved. Some people following their kids and moving to places."

2.5.2.2. Community as a Place of "Home"

Attachment to community as a place of "home" is embedded in the accumulated life experiences and memories of being born/raised in the community, or living in the community for a considerable period of life. Therefore, the notion of community as a "home" represents the community's physical and social aspects, in addition to being the physical space with all the memories and experiences associated with such dwelling. The notion of home represents feeling comfortable within the community, and assimilated/shared life experiences and memories in the community. To this end one young resident, who moved out but came back to the community before the boom, noted:

> "I loved all the places that I lived but at the end of the day I came back home. I would say that when I was 18 years old I couldn't wait to get out. It was just a feeling that there was more out there for me. I got a chance to do that, and I realized when I came home that a place is what you make it to be at the end of the day. I found ways that I really love here and its home."

Residents became attached and built memories to physical community attributes (local land marks, or amenities) and social attributes. Feeling of home has been negatively affected by the rapid influx of people, rapid pace of change in community life, outmigration of longtime residents, and loss of small country town environment because of development/ expansion of the community to accommodate the growth in population. One participant described this as: "we can't wait until we get out of here. The only thing that is preventing us from moving is that over

that 30 some years this became our home and we have real good friends. We won't be close to them once we move."

2.5.2.3. Attachment to Rural Way of Life

One of the main reasons why people chose to live in western North Dakota is because they value the rural way of life. Rural way of life is characterized by slower relaxed pace of life, endogamous relationships, agriculture based economy, and conservativeness (simple basic community needs). This value theme is closely related to sense of peacefulness and personal freedom, but it represents an affective bond to way of life as described by one of the participants: "I value and have a passion for rural areas and the life that comes with that. You may choose to live here because of your family but you often times are coming for the rhythm of rural that has its own complement to that." This value theme is especially of high importance to people living in rural communities outside of hub towns in the area. The rural way of life has been affected by the rapid pace of community change, dominance of the oil industry and related activities, traffic and noise of industrial activity, and rapid influx of people. The rapid pace of change in the community and way of life has affected many residents. One of the residents described this:

> "Well you know the fast pace. We are used to the old days where people weren't in a hurry. Even my son is only 38 years old he wants to leave. He's young but he wants to leave because the fast pace and traffic and he wants to leave. We used to have more like laid back."

Another participant noted: "so living out in the country and this community area has changed. People aren't as friendly anymore. Now we got all these different man camps and areas popping up every which direction which has caused an issue"

2.5.2.4. Attachment to Land and Surrounding Environment

As farmers or ranchers and rural residents, western North Dakotans have a strong connection to the surrounding land and physical environment. Attachment to land is expressed based on serenity and tranquility of the surrounding environment and psychological investment in land. A longtime resident described the effect of the oil boom on land:

> "One of the biggest tradeoff of this money is the land it's getting ripped apart. It used to be green grass few fences here and there, now there's red scoria roads going to an oil well. It will never be the same and it's really changed our land and the land was one of the main things in our way of life here."

Change in natural landscape (interspersed oil wells, well pads, constructed access roads, and certain practices associated with the oil industry such as gas flaring) and traffic, has negatively affected the resident perception of attachment to land. One participant noted: "I mean there wasn't a lot of traffic. I live in the country. There wasn't a lot of electrical poles everywhere. Now there's electrical poles to all those pumpers and you know so before then it was just cows and calm."

2.5.3. Dependence on Community

Dependence on community represents those community values pertaining to how members aim to fulfill their needs associated with their way of life through the available community resources. Since the last boom in the area went bust in the early 80's, life in western North Dakota has settled into a largely agricultural based life.[21] In addition to agriculture, some

[21] Although there are hub towns or cities like Dickinson, Watford City, Williston, and Minot they are in no way large cities and therefore the area is largely rural in context and nature.

small areas in south-western North Dakota have a manufacturing base. In addition, Theodore Roosevelt National Park and the Badlands provided economic opportunities in recreation and tourism for nearby communities. Although oil activity has been part of the economy since the 1950's, it was in the production, rather than drilling stage. One participant noted that: "there's always three big ones oil, agriculture, and tourism. Oil and agriculture kind of go back and forth with each other." The agricultural industry has undergone consolidation for many years. Large farms mean fewer job opportunities; therefore, people in either farming/ranching or other established economic ties remained in the area and most young people moved out of the community looking for better economic opportunities. There was minor in-migration based on the community's nature and context. Some people who moved away, and then wanted to raise a family and settle returned to their origin community. Others retired to their home community. As a result the community needs largely represented conditions required for raising families or for retirement. Therefore, major community value themes that undergird dependence on community include safety and security, and community vitality, or the lack of it before the boom. Figure 6 summarizes the effect of the impacts created by the boom on relevant values and the resulting attitudes under DOC.

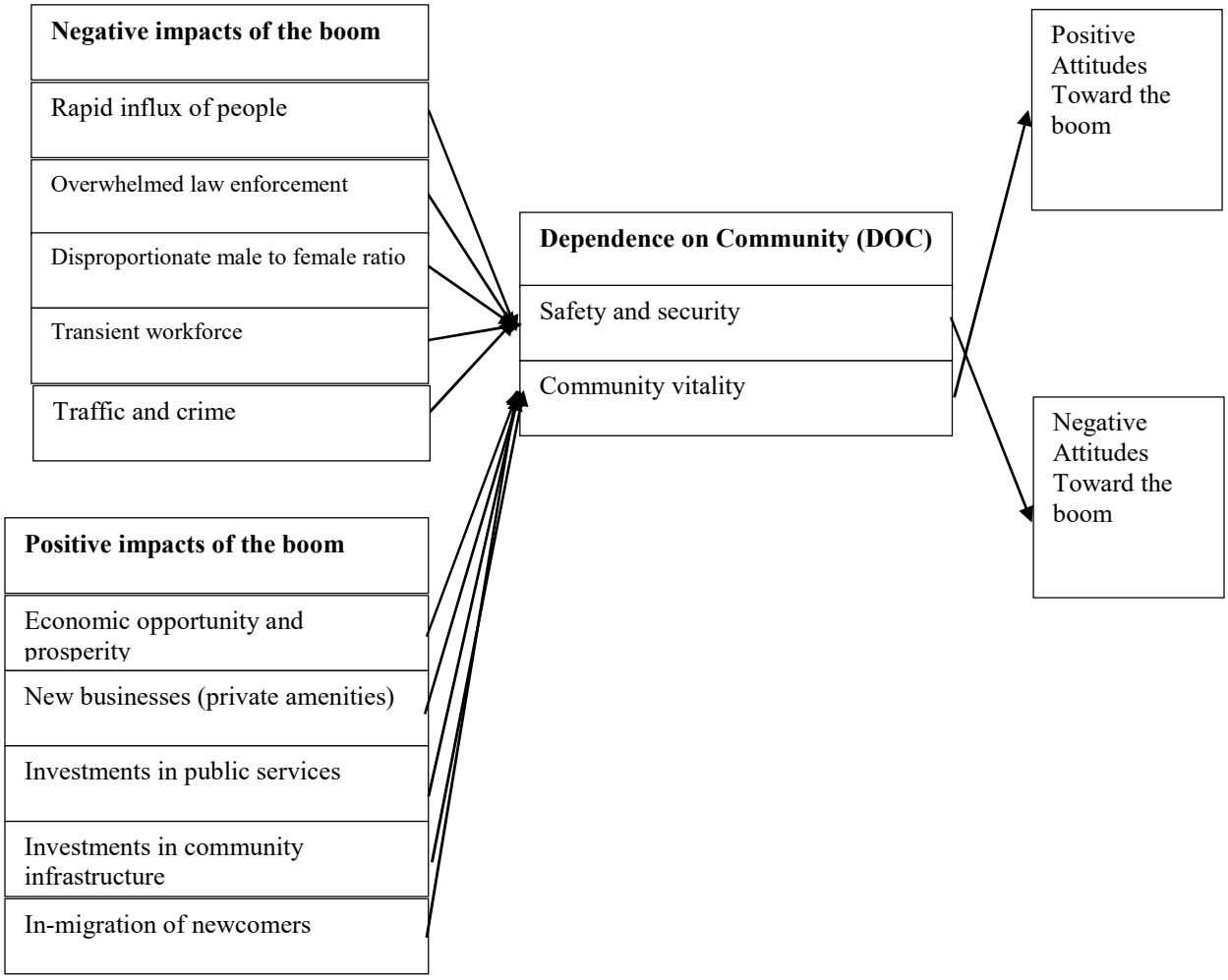

Figure 6. Effect of the Boom on DOC

2.5.3.1. Safety and Security

Felling of safety and security emerged as the most prominent value theme expressed by the participants. Several values undergird feeling of safety and security: high density of acquaintance, stable (predictable) community, low level of crime and accidents, and accessible law enforcement (community amenities). Feeling of safety and security has been negatively affected by the rapid influx of people, overwhelmed law enforcement and public services, disproportionate male to female ratio, transient nature of oil industry workforce, and increase in

crime and traffic. One participant described the context of safety and security, why it was valued, and how it has been affected as follows:

> "Everybody knew everybody. It always felt safe, and [you] didn't have to worry about locking your doors and that kind of stuff. It was a safe environment for the kids. Feeling safe for me is the number one thing when you are raising a family. So now there's all those concerns you don't know who's out there. You don't know everybody, don't know their nature."

Most of the oil industry workers are working very long hours, or they work for a few weeks and then on their breaks, go back home to where their families are. This heavy/transient work schedule does not allow longtime community members to get to know the new people in the community. As a result, feeling a lack of safety causes people to be more guarded and vigilant as explicated one participant:

> "We used to trust everyone because we knew everyone. Now you don't know people, you don't trust people and when people lose the sense of trust you become nervous and skeptical. Not that they are bad people it's just that people you don't know and you don't have a relationship with."

Another female participant noted that: "I think people take more caution. You didn't use to lock your house or car not anymore. It's definitely outnumbered male to female and it definitely doesn't seem safe."

2.5.3.2. Community Vitality

Community vitality is expressed based on: economic opportunity, availability of community amenities,[22] investments in community infrastructure (such as roads and housing), and people moving in and out of the community. This is one of the value themes that is viewed with a negative connotation before the boom, as outlined by one longtime resident: "we didn't have the stores, you know. The wages weren't that good. But I mean we made do with what was there. There wasn't a lot of theatre or anything like that. You know shopping, etc."[23] Most communities in western North Dakota experienced a lack of economic opportunity, lack of new investments, additions to public and private community amenities, and infrastructure. Therefore, most communities, especially small communities outside of hub towns, faced significant constraints or barriers to spur economic activity and growth. But it also meant that the communities adapted and made do with what they had, which is strongly embedded in other values such as sense of culture and conservativeness. One longtime resident described the context:

> "I think we had a real high quality of life here. That kept people here. Even if there wasn't the highest and best employment opportunities during the downtimes people still stayed here because the quality of education was very high. The quality of recreational, especially outdoors was very high. The quality of life the community was able to provide in terms of public safety and public services were also very high. So I think that's what kept the people here prior to the boom."

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[22] Private community amenities including businesses, retail, shopping, dining, entertainment etc. and public community amenities including education, health, law enforcement, emergency services, et cetera.

[23] This comments also exemplifies the conservativeness of residents.

As expected, the oil boom has had the greatest positive impact on community vitality. Community vitality is the main altruistic value theme that has influenced people to have favorable attitudes towards the boom. There is plenty of economic opportunity, new businesses are moving in to the community, schools are expanding, investments to improve housing and infrastructure can be seen in every community, and people, especially young people are moving into the community. Residents in western North Dakota are happy about the opportunity to rejuvenate their communities as described by one participant:

> "That's the good part of the boom. We're starting to get in some things we needed. Physically it has brought a lot of money into the area. Expansion of certain community amenities like the community center that we couldn't or wouldn't do before. We are building more schools. For years the school population was declining and we needed young people coming here and that's a plus."

It is also important to highlight that before the boom most recreation and entertainment choices were based on a variety of nature/environment based amenities, such as hunting, fishing, camping, hiking, walking, and few community amenities, such as the theatre and community center. These amenities are typical of rural life. But with the boom, the communities have experienced additions to the community centers and other similar choices, while opportunities for nature based activities have been limited by the influx of people and industrial nature of oil activities. As a result the lifestyle choices are changing from largely rural to more suburban style of living, especially in the hub towns.

As indicated in figures 4,5, and 6 the impacts/changes caused by the boom on many major community themes outlined under SOC and ATC generated negative attitudes towards the boom while the impacts of the boom on major community themes outlined under DOC generated

positive attitudes towards the boom. Several constructive implications for community planning and decision making can be outlined based on the community values and attitudes identified in this study. Analyzing figures 4, 5, and 6 show that negative impacts on community values (and the resulting negative attitudes towards the boom) are mainly generated by: rapid influx of people, rapid pace of change in community life, out-migration of longtime residents, and traffic and noise associated with industrial activity. Therefore, local planners and decision makers must develop strategies and solutions to address these impacts. The positive impacts on community values (and the resulting negative attitudes towards the boom) are generated by: investments in community infrastructure and public services, increase in diversity, and in-migration of people that grew up in the area.[24]

2.6. Discussion

The community values described in this study represent values shared by longtime residents in western North Dakota. Interviews with newcomers revealed differences in values, especially those from urban backgrounds. Stedman (2006) stated that newcomers cannot share values of the real community because they have not contributed to their creation. However, a qualitative methodology cannot substantiate the differences between the values of newcomers and longtime residents. Therefore, further research should focus on: whether the values of new residents are different from those of longtime residents; and how intermingling new residents' values with those of longtime residents would shape and contribute to community planning and decision making.

[24] There are also other positive and negative impacts of the oil boom that especially affects quality of life and these are discussed in detail in our other research work.

Wilmot (2009) outlined that qualitative research efforts could aid in understanding the factors influencing respondents' decisions to leave their community and provide a more nuanced understanding of resident behavior. Several values identified in this study would play a key role in people's decisions to stay or leave the community. However, this study only presents the values and attitudes, and does not venture into the realm of predicting or assessing behavior based on the identified values and attitudes. Several theorists (Allport 1961, Rokeach 1973, Eagly and Chaiken 1993) have linked values and attitudes to behavior. To this end Mesch and Manor (1998) found that greater number of friendships, close neighboring ties, and general satisfaction with the physical and social environment, will negate out-migration. Therefore, further research is necessary to identify or predict the behavioral tendencies based on values and attitudes and to understand how residents prioritize /trade-off community values. That being said, it can still be inferred that people who have a strong priority towards value themes such as sense of peacefulness and freedom, strong attachments to land, and rural way of life may feel dissatisfied and frustrated by the changes caused by the oil boom and may even decide to leave the community (this requires further study).

Several studies have found profound connections between rural residents and their land. Thompson and Blevins (1983) contended that how inhabitants perceive and value their physical environment needs diligent examination in order to better understand their attitudes towards energy development. Logan (1996) outlines that rural people value their open spaces and the big sky similar to the participants of this study. Chang (2010) found that the potential side effects of pursuing economic development of urbanization, increased crime, environmental degradation, and other social or environmental problems were unbearable to those have strong environmental or social focused perceptions and attitudes. Therefore, residents with strong environmental or

rural inclined values might decide to move away from the community, while the boom will still attract new people or families into the community and many other longtime residents will decide to stay.

Sense of unity and togetherness, attachment to social support groups, and safety and security emerged as the most frequently mentioned community values under SOC, ATC, and DOC respectively. These three value themes are closely interrelated. McMillan and George (1986) also outlined that strong communities offer members positive ways to interact, important events to share, opportunities to invest in the community, and opportunities to experience a bond among members. As a result, from a value based perspective the community planners and decision makers need to develop strategies to: (1) improve feeling of safety through investment in public services; (2) establish and enhance social support groups; and (3) enhance the sense of unity and togetherness through better community integration strategies. Further research is necessary to explore the nature, potential, and opportunities for development of social mechanisms and organizations that would enhance community integration so that new residents feel and become a part of the community.

Some efforts to enhance sense of unity and social support groups can already be observed in the area where community groups such as Williston Friendly Faces, Oil Field Wives, local churches, and outreach efforts of the oil industry are trying to improve community integration and interaction. Community policies and strategies must foster these efforts. The economic dynamics associated with the boom provides community vitality that is a prerequisite for community development. It is critical to capture this opportunity and develop better communities reflective of established community values, so that the boom becomes a blessing and not a curse on communities in western North Dakota.

Comparison of findings of this study to similar studies on oil or gas booms reveal many consistencies. Baxter and Greenlaw (2005) found themes, such as small town, nature, and neighborliness, emerge when residents talk about what they value about their community. Brasier et. al (2011) found that many rural Pennsylvanian residents worried that outsiders moving in might not value "their way of life." The study showed how many respondents spoke of their county as special to them and possessed a rural lifestyle they valued. The study also highlighted that economic benefits are often the main reason energy development is embraced by community members, particularly in communities with histories of economic decline or poverty. A study by Anderson and Theodori (2009) revealed several positive and negative consequences of energy development. The positive impacts were related to stimulated economic prosperity, increases in city revenue, property values, household income, benefits to the retail sector, improvement of shopping choices, and the presence of new businesses. The negative consequences were classified into three categories: potential threats to public health and safety (increased truck traffic), environmental concerns, and quality of life issues. In a study of western Nevada County residents, Cross (2001) found that residents did not like the increased anonymity caused by the influx of people, and that intimate relations with the natural environment was one of the main factors that defined place attachment. Similarly, the value themes identified in this study conform to and reaffirm the values in a rural community and how they are affected during a period of transformation such as during an oil boom.

There are few limitations of this study. The findings presented in this chapter is contextual and specific to conditions in western North Dakota. Therefore, its applicability to other rural areas currently experiencing expansion of oil and gas drilling will depend on the similarities in way of life and whether industries such as agriculture dominated the community

choices and preferences before oil and gas expansion. There are also several Native American reservations in the area. This study did not focus on examining Native American values or their value systems. Native American community values might differ from values of other communities in the area. These issues are proposed for future research.

2.7. Conclusion

This descriptive study has set the foundation for further studies by qualitatively studying the community values in western North Dakota and laying the groundwork for understanding the attitudes towards the oil boom. The findings clearly provide qualitative evidence to support that attitudes emerge on the basis of one's perceived expectations or evaluations about how an attitude object or development affects the particular things that people value. In terms of impacts of the boom, analyzing figures 4, 5, and 6 that negative impacts on community values mainly emanate from rapid influx of people, rapid pace of change in community life, out-migration of longtime residents, and traffic and noise associated with industrial activity. Therefore, local planners and decision makers must develop strategies and solutions to address these impacts. From a value based perspective the community needs to develop strategies to: improve feeling of safety through investment in public services; establish and enhance social support groups; and enhance sense of unity and togetherness through better community integration strategies to build better communities that are reflective of established community values.

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3. AN OIL BOOM'S EFFECT ON QUALITY OF LIFE (QOL): LESSONS FROM WESTERN NORTH DAKOTA

3.1. Abstract

This chapter presents a holistic framework to understand the effect of an oil boom on Quality of Life (QoL) in western North Dakota. Compared to quantitative QoL studies that focus on cities and urban QoL or studies that compare/contrast QoL between different communities, this descriptive and qualitative study focuses on the heterogeneous QoL perceptions among different stakeholder groups, within a community, in a rural setting, during a period of rapid social and economic transformation. The focus allows for a new way of looking at the significance of changes caused by oil development on QoL of stakeholders in a rural community, which provides a useful lens for studying QoL changes in many other rural communities currently experiencing unconventional oil/gas development in the United States.

The framework presented captures the contextual determinants and indicators that constitute QoL in a rural context. The findings show that some significant impacts of the boom (both positive and negative) affect QoL of everyone in the community, while other impacts only affect certain stakeholder groups based on their positioning in the economic/income structure and level of exposure to local inflation. Implications of the findings on community planning and development on ways to improve QoL are presented and discussed.

3.2. Introduction

The 2005-7 oil drilling resurgence has instigated a full scale oil boom, which has completely changed the nature and context of rural communities in western North Dakota (Bangsund and Leistritz 2011). Communities in western North Dakota, which endured many years of population decline and lack of economic vitality, are now experiencing significant economic growth, infrastructure developments, and rapid population increases. England and Albrecht (1984) used the term "Social Disruption Hypothesis" to outline that communities will experience disruptions when rapid influx of people alter established norms and social structures and cause significant changes in the composition and dynamics of the local population. Social disruption hypothesis states that: (1) an array of social problems indicative of overall community disorganization can occur; (2) they occur because of rapid growth; (3) communities enter a period of generalized crisis and loss of traditional worldviews, way of life, and attitudes; and (4) disruptions involve changes to both the biophysical and social worlds (Park and Stokowski 2009; England and Albrecht 1984; Freudenburg 1984; Kasperson and Kasperson 1996; Krannich and Greider 1984). Such disruptions significantly challenge the status quo of a community and understanding how disruptions impact Quality of Life (QoL) of residents is an important subject for sociological research (Besser et al 2008; Gabriel et al 2003).

QoL during periods of rapid social transformation has been discussed in detail in media, policy and community meetings, and in research work. For example Ruddel (2011) found that population growth resulting from resource development had a significant impact upon a Canadian town's QoL. Besser et al. (2008) study of economic shocks[25] show that gaining

[25] Economic shocks were defined as "events that have had a significant impact on local economies (P. 2)."

employment impacts between 1990 and 2003 resulted in significant improvements in subjective QoL by 2004. Anderson and Theodori (2009) study of two Barnett Shale counties demonstrated that localities experiencing unconventional energy development face both negative and positive consequences. Similarly, Brasier et al. (2011) contends that natural gas development in the Marcellus Shale caused impacts on local economy, aesthetic quality, agriculture, environment, social relations and conflict, physical infrastructure, population change, community survival, and social services.

Numerous other studies that focus on social disruption hypothesis, social impact assessment, and boomtown sociology have explicated the impacts of booms. Therefore, boom related community impacts and changes have been well researched. But only a handful of studies have used qualitative research methods to investigate rural QoL during a boom (Matarrita-Cascante 2010; Anderson and Theodori 2009; Brasier et al. 2011 etc.). However, none of these studies focused in detail on differences in QoL among various stakeholder groups within a community. In addition QoL studies at the community level have largely focused on cities and urban QoL aimed at ranking or rating cities/communities etc. This study aims to address these gaps through its qualitative, descriptive nature, and focus on QoL in a rural context during a period of rapid energy development.

The oil boom in western North Dakota presents a valuable opportunity to study QoL in a rural community during a period of rapid energy development, at least based on three reasons. First, the area experiencing the boom is a rural area that has undergone two previous booms, where the overall community experiences were not that positive or favorable. Second, for around 30 years since the last boom ended the area settled into a largely agricultural based rural way of life, which has been stable for a sufficient period to become well established. Therefore, the QoL

before the current boom sets the frame of reference or the lens through which the changes caused by the boom are perceived. As a result, this study provides an opportunity to understand what constitutes rural QoL and how it would be affected by rapid industrial transformation. Third, the boom began during a period of time when the American economy was going through the worst recession since the great depression. As a result, western North Dakota received a lot of national media attention and attracted a larger number of people from all over the country. Therefore, the communities have experienced a rapid influx of people within a very short period of time, which creates an opportunity for examining the effect of a disruptive/transformative event on QoL of community members.

An extensive understanding of community members' QoL could generate outcomes that would assist in development of better communities. First, a person's assessment of QoL represents the livability of a place or the happiness/satisfaction with a place (Leitmann 1999).[26] From a community development/ planning standpoint, understanding such assessments would provide perceptive insights to improve the conditions/context of the community so that residents are happy and satisfied (Myers 1988; Swain and Hollar 2003). Second, resident behaviors or decisions are predicated on perceptions of QoL. Residents will support and welcome decisions or strategies that enhance their QoL and will resist those that will negatively affect QoL. Therefore, understanding what constitutes QoL of residents provides the community planners or decision makers an opportunity to craft strategies that will be accepted and supported by residents. Third,

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[26] At the core of this argument is an empathetic consideration that QoL studies should focus on the extent to which the necessary conditions for personal satisfaction and happiness are achieved. Therefore, it is important to identify what factors constitute QoL in a particular context. These factors comprise an array of attributes within a particular setting/environment or place.

a qualitative/ descriptive study on QoL would set the baseline or foundation for subsequent quantitative/deductive QoL studies that aim to measure the changes in QoL or associate QoL with intended behaviors.

The structure of the chapter is as follows. The literature review section defines the study's important concepts and sets the theoretical framework. The methodology section discusses the overall methodological approach adopted. The results section is organized into two parts. First part discusses what factors (or domains) constitute QoL in a rural setting or rural way of life. Second part presents the holistic framework developed through the study, which demonstrates how the oil boom affects QoL of different community stakeholder groups. The discussion section focuses on the implications of findings on community planning and development, comparison of the findings with other studies, limitations of the study, and directions for further research. The chapter finishes with a brief conclusion.

3.3. Review of Literature

This review is comprised of four sections. The first section describes and defines QoL within the scope of this study. The second section discusses the features and characteristics that constitute QoL in rural area. The third section analyzes the impacts and conditions created by rapid energy development. The forth section summarizes how impacts of rapid energy development affects different stakeholder groups in a community.

3.3.1. What is QoL?

QoL is a dynamic and a multidimensional concept. Review of literature cited below indicates the dynamic and complex nature of the theoretical conception of QoL, especially when it includes the nebulous notion of well-being. For example, Felce and Perry (1995) defined QoL as "an overall general well-being that comprises objective descriptors and subjective evaluations

of physical, material, social, and emotional wellbeing together with the extent of personal development and purposeful activity, all weighted by a personal set of values (pg. 60)." Comparatively Cummins et al. (1997) states that QoL "is both objective and subjective, each axis being the aggregate of seven domains. Subjective domains comprise: material well-being, health, productivity, intimacy, safety, community, and emotional well-being while objective domains comprise culturally-relevant measures of objective well-being. (pg. 6)." Epley and Menon (2008) claim that their community QoL (CQOL) "represents a group of socio-economic and environmental indicators (indicators are organized around five sectors: crime, health, employment, education, and recreation) that contribute to the livability and desirability of the region (pg. 285)."

Michalos et al. (2006) contends that happiness, subjective well-being, life satisfaction, the good life, the good society, economic wellbeing, family well-being, and quality of work life are directly related to QoL. The definitions and previous research surveyed highlight the multiplicity and plurality of QoL constructs and the concepts associated with QoL. Leitmann (1999) argues that there could be no universal or objective measure of QoL for three reasons: (1) different levels of observation (individual and group) can have conflicting outcomes; (2) diversity in the definition of QoL measures can result in different answers; and (3) contextual factors can lead to different definitions of quality. Therefore, it is difficult to construct a universally agreeable definition or a standard form of measurement of QoL (Cummins et al. 1997).[27] However, it is possible to agree on some general features of QoL and an approach to study QoL.

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[27] Allison et al. also (1997) identify QoL as a dynamic phenomenon, where the construct is affected by such factors as adaptation, coping, expectations, and optimism, in which a person's

QoL can be studied in three main ways. First, QoL can be based on personal determinants such as health, education, marital status and income (including access and availability) that represent the respondent's socio-economic status, immediate experience, and well-being. The focus here is on QoL at the individual level. Second, QoL can also be envisaged as relating to places and their characteristics in terms of availability and access to factors that constitute QoL (Rogerson 1999). Third, a selected combination of both individual level and place level characteristics can be employed to construct QoL. Many studies including Rogerson (1999), Brown et al. (2000), and Meader et al. (2006) have adopted a selected combination approach.

Review of literature outline the use of several contextual indicators to study QoL. Besser et al. (2008) developed a factor scale composed of three items measuring residents' overall satisfaction with government services, non-governmental services, and the community in general to evaluate community QoL.[28] Perdue et al. (1999) contends that primary factors affecting resident QoL are job opportunities, community services, facilities particularly related to safety and congestion, community social opportunities and involvement, and perceived community political influence (residents influence over local political decisions). Several indices have been constructed to measure QoL.[29] Table two summarizes the QoL indicators used by different indices and studies. It is clear that although a standard set of QoL indicators are useful as a

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past and present events coupled with his ability to adjust, change, and his expectations about the future affect the construct of QoL.

[28] Additionally the study used the notion of social capital to denote relationships and interconnections. Social capital included residents bonds to others as well as residents bonds to local institutions including work (service and fraternal organizations, recreational groups, political and civic groups, job-related organizations, church-related groups, or other).

[29] Some of these QoL indices such as Physical Quality of Life Index (Morris 1979), Human Development Index (UNDP 1990), and Dasgupta and Weale (1992) are macro in nature and useful for comparison of QoL between countries and other large groups and not within the scope of this study.

starting point, they are inadequate to construct a broader understanding of QoL within a certain context.

A comparatively better approach is to identify and outline contextual indicators of QoL by engaging and involving the community members. To this end Leitmann (1999) argues that useful QoL indicators should not try to be universal and objective, instead they should be relevant and subjective in such a way that it represents the local issues and conditions.[30] Leitmann (1999) also proposes a framework for making QoL assessments more relevant. The framework consists of three elements: (1) a process by which QoL indicators should be locally developed through input of stakeholder consultation; (2) an output in which developed, collected, and evaluated QoL measurements are linked to design of policies and programs; and (3) use of a series of tested guidelines that ensure that QoL indicators are realistic. In order to achieve more useful results, therefore, the selected indicators should be pertinent and represent the nature and context of the QoL being studied (Pink 2008; Matarrita-Cascante 2010).

[30] Cox et al. (1992) also recommends the use of context specific scales in assessing QoL.

Table 2. Summary of Factors/Indicators Used in QoL Indices and Other Research Studies

QOL factor	Cummins et al. (1994).	Narayan et al. (2000)	Lee (2008)	Moro et al (2008)	Brambilla et al (2011)[31]	Gonzalez et al. (2011)
Material well-being (housing/possessions/employment/income)	X	X	X	X	X	X
Health and education (at a personal level)	X	X				
Demographic variables (age/sex/marital status)				X		
Recreation and entertainment	X		X		X	X
Family condition/ relationships with others	X	X	X			
Safety and security (crimes/job security etc.)	X	X	X	X	X	X
Involvement in community	X	X	X			
Emotional well-being (self-esteem/stress/happy/satisfaction)	X	X		X		
Freedom of choice and action		X				
Quality of surrounding environment (pollution/cleanliness/ serenity)			X	X	X	X
Community amenities (both public: access and availability of health, education, transport emergency services etc., and private: businesses, retail, dining etc.)		X	X	X	X	X

Keles (2012) identified three main characteristics of individual QoL. First, it reflects an individuals' life situations and his perceptions. Second, QoL is a multidimensional concept covering multiple life domains such as housing conditions, education, employment, work life

[31] Brambilla, M.R., Michelangeli, A., and Peluso, E. (2011). Equity in the City: On Measuring Urban (Ine)Quality of Life. Working Paper DISCE 0101.

balance, access to institutions and public services. Third, it brings together objective information on living conditions with subjective views and attitudes to provide a picture of overall well-being. The totality of a person's life can be thought as a mosaic field made up of many specific domains in which the individual participates (Hagerty et al. 2001; Lee 2008; Rahman et al. 2011). Rice et. al. (1985) identified several domains such as experiences with family, work, friendships and connections, housing, commuting, entertainment and leisure, income and financial security, and neighborhood that affects perception of QoL. Lee's (2008) model also links domain satisfaction and life satisfaction. Similarly Moons et al. (2006) contended that defining QoL in terms of satisfaction with life is the most appropriate conceptualization. Other studies such as WHOQOL group (1998) have followed a similar domain approach. The concept of life domains provides an important lens for organizing and conceptualizing a person's life.[32] Therefore, it can be agreed that by using a combination of domains representing work life and non–work life and focusing on QoL indicators within each domain it is possible to construct a broad and comprehensive perception of QoL.

Narayan et al. (2000) proposed three broad questions that QoL studies need to explore (pg. 306). Two of these questions focus on how people define good/bad QoL and how do they cope with decline in QoL.[33] Therefore, by focusing on how different stakeholders define and describe good/bad QoL within a certain community context it might be possible to identify the factors that differentiate QoL among different stakeholder groups. Rosen (1979), Roback (1982),

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[32] Similarly, Sirgy et al. (2010) articulated a measure of community well-being based on the notion that community residents perceive QoL based on the conditions in various life domains (e.g., family, social, leisure, health, financial, cultural, consumer, work, spiritual, and environmental domains).

[33] The third questions focuses on how people perceive risk, vulnerability, opportunities, social exclusion, crime, and conflict and how these perceptions change over time.

Blomquist et al. (1988), Greenwood et al. (1991), and Winters (2012) argue that QoL assessments could be made based on differences in wage levels, housing prices/rent levels, and amenities (termed the hedonic approach).[34] Borooah et al. (2011) contended that factors such as employment, income, and family circumstances have a greater influence on QoL. From an economic standpoint people who are employed with a good income would have a higher subjective assessment of QoL, compared to unemployed and low income earners (Borooah et al. 2011). The focus of this study is the QoL differences among various community stakeholder groups. Therefore, it can be argued that differences in income or employment status is a strong factor that causes differences in perception of QoL.

Overall, few important conclusions instrumental for setting this study's theoretical framework can be drawn based on the review of the literature. First, QoL is a contextual concept. Second, factors or indicators that define QoL within a certain community context must be identified by engaging the community constituents. Third, these factors should include both individual level and place level characteristics to provide a broader understanding of QoL. Fourth, by using a combination of domains representing work life and non–work life and focusing on QoL indicators within each domain, it is possible to construct a broad and useful perception of QoL.

3.3.2. QoL in a Rural Community

The focus of this review is on QoL of rural communities largely dependent on agriculture and associated industries in the Midwest and Great Plains. In comparison, QoL in rural areas rich

[34] But all these studies focus on between community comparisons.

in recreational natural resource amenities and largely dependent on tourism may be significantly different.[35]

Rudzitis (1999) argues that in rural areas, and probably elsewhere, employment alone is insufficient to explain why people move and live where they do. Rural people are often seen as living under conditions of fewer jobs,[36] lower incomes, fewer educational facilities, basic health care services, and basically too little of most important services (Dilman and Tremblay 1977; El-Osta 2007; Arbuckle, Jr. and Kast 2012). Rural people are well aware of the shortcomings of their communities (Dilman and Tremblay 1977; Jobes 1987). However, these inadequacies are balanced by more positive evaluations of other community qualities such as a slower pace of life, living in a stable and familiar environment, less congested safe neighborhoods, sympathetic neighborhood child watchers, unlocked houses and trucks, being able to recognize practically anybody in the community, strong community ties and trust in neighbors and workmates, informality in business, being part of informal life support systems, open and ample green spaces, deep utilitarian bonds with the natural environment and landscape of the area, and clean environment (Dilman and Tremblay 1977; Gold 1985; Krout 1988; Deller et al. 1999; Rudzitis 1999; McGranahan and Beale 2002; Kemp 2008; Alter et al. 2010). Most rural agricultural based

[35] For a discussion of QoL in recreational based rural areas see Deller et al. 1999.
[36] Arbuckle, Jr. and Kast (2012) contend that rural areas in Midwest and Great Plains have experienced long-term stagnation or decline in well-being (also punctuated by crises e.g., the Farm Crisis of the 1980s), where processes of agricultural consolidation and restructuring and loss of manufacturing jobs have led to population loss and concomitant declines in ability to provide necessary services among municipalities.

communities have gemeinschaft[37] social structures, where interaction has a primary form[38] made possible because the population is small, stable, mutually interdependent and largely independent from outsiders. Community members must share in the operation of their schools, work, law enforcement, personal welfare and the other essential institutions, if the tasks of survival are to be accomplished (Jobes 1987).

In a study of rural and urban living preferences, Dilman (1979) found that those with rural preferences substantially based their preference on factors such as less crime, quality of air and water, better for children, and lower cost of living while those holding urban preferences largely based their preferences on factors such as better jobs, higher wages, and contacts with a variety of people. Factors such as recreation or culture, near family or friends, and better schools were mentioned only slightly more often by respondents holding rural preferences. Residents who preferred metro size communities were significantly more likely to deem a wide variety of stores and businesses, cultural opportunities, and opportunities for eating out as "essential" in the community while those who preferred rural living were significantly more likely to deem low levels of pollution, more privacy, and more outdoor recreational opportunities as essential. As a result, Dilman (1979) concludes that those who prefer rural living may be looking for different attributes in their communities.

Arbuckle, Jr. and Kast (2012) found that farm family QoL is positively related to household income (total household income rather than farm income) and community vitality,

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[37] Gemeinschaft values and behavior prevail when social interaction occurs principally on the basis of traditionally of customary familial roles, long-standing obligation, and mutual trust. Comparatively Gesellschaft leads to complex impersonal patterns of social interaction and values emerge with people's interests protected formally by contract and law (Gold 1985).
[38] Face-to-face, personally familiar systems based upon sharing mutually valued activities over extended periods

while individual stress and economic dependence on farming were negatively associated with QOL. Therefore, QoL of farmers and their families is largely dependent on collective community well-being and overall household income than on economic benefits derived from the farming occupation. This finding has important rural development implications. Similarly, Flora (1998) found that QoL of farmers in the North Central region is not related— either positively or negatively— to standard of living. Two main factors that affected QoL positively were having choices in the productive work that one does and the respect of family and people who matter to one in the community. As a result, Flora (1998) contends that rural development is most effective in improving QoL when increased diversity, both in the environment and in the economy, leads to increase in social capital—the norms and networks that provide for a collective identity and mutual respect. As a result, rural development programs must focus on several aspects such as economic welfare through diversification, provision of basic services, a social network of relationships and associations as well as the cultural environment that makes life enjoyable and satisfying when trying to improve rural QoL (Richmond et al. 2000).

3.3.3. Impacts of Rapid Energy Development or "Booms"

Various impacts of rapid energy development have been explicated under a plethora of articles that fall under fields such as "social impact assessment,"[39] "social disruption hypothesis/theory,"[40] and "boomtown" literature. The basic mechanism underlying the

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[39] A field of social science and a component of the policy-making process. SIA's are generally anticipatory efforts to project likely impacts before they occur but empirical SIA work has looked at a broad range of social and cultural impacts. The purpose of SIA studies is to assess the impact of what a project is doing or might do in the future on the QoL in the community (Freudenberg 1986).

[40] Social disruption theory states that communities experiencing rapid growth typically enter a period of generalized crisis and loss of traditional routines and attitudes (Park & Stokowski 2008).

boomtown model is the rapid growth of population that occurs as individuals move into an area to take advantage of employment opportunities (Gramling and Brabant 1986). As a result, this review is organized around three main impact areas: (1) economic impacts, (2) logistical and infrastructural impacts, and (3) social impacts.[41]

Energy development has generated many positive economic benefits in the form of increased jobs, higher pay, overall economic prosperity, tax revenues, more services, new economic opportunities for local businesses and landowners (mineral and lease rights owners), and influx of young people (Murdock and Leistritz 1979; Reynolds Jr et al. 1982; Anderson and Theodori 2009; Christopherson and Rightor 2011; Brasier et al. 2011; Ladd 2013; Measham and Fleming 2014). These economic benefits contribute to an increase in the material QoL of local residents through the alleviation of economic hardship. The economic impacts of energy development derive predominantly from the efforts of interested parties to identify and to respond to the implications of development — whether as "opportunities"(to those who see the changes as positive) and/or as "threats"(to those who feel otherwise) (Freudenburg and Gramling 1992).

In addition, evidence from already developed shale plays indicates that shale gas drilling relies heavily on a workforce that resides in Texas and Oklahoma and moves with the rigs from one shale play to another (Christopherson and Rightor 2011). Typically, long-term residents in rural communities where development takes place do not have the specialized skills and training necessary to work in the industry, so companies must recruit qualified workers from other regions (Lovejoy and Little 1979). As a result, local employment is largely concentrated in

[41] Other impacts on the environment are not within the scope of this study

trucking, construction, and retail jobs — many of which are part-time, short-term, and low-wage (Christopherson and Rightor 2011).

Rapid energy development leads to several logistical challenges or impacts such as increased strain on local infrastructure including roads and housing; overwhelmed public services including health, education, and emergency services (Anderson and Theodori 2009; Jacquet 2011; Schafft et al 2014); traffic issues, accidents, and other safety concerns; increase in cost of living (Jacquet 2011; Brasier et al. 2011); and lack of affordable housing and concomitant outmigration of longtime residents (mostly seniors or others on fixed incomes) living in rental housing (Williamson and Kolb 2011). Small rural communities are often ill-equipped to deal with growth management challenges, as they frequently lack financial resources, professional personnel, and experience in coping with rapid change (Maki and Leistritz 1981).

The social impacts of energy development are centered around noise[42] (Ladd 2013); increased levels of antisocial behavior, disorder, and crime (Reynolds Jr et al. 1982; Ruddel and Ortiz 2014); impacts to the rural landscape or biophysical environment[43] (Alter et al. 2010); impacts on social networks and relationships (Murdock and Leistritz 1979); and lack of newcomer integration into the community (Ford 1977). Recker (2009) found that changes in the subjective measures (norms of reciprocity and trust) explained considerable variation in QoL during periods of economic shocks than structural measures (networks). Ruddel and Ortiz (2014) found that residents in a Canadian boomtown were not typically worried about violent crime, but

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[42] As it disturbs the peace and quiet nature of the surroundings

[43] Rural people develop deep bonds towards their environment. During a study by Alter et al. (2010) participants expressed concern about the impacts on the landscape, and relatedly, their desire to live in the area. For many, the rural nature of these areas is the reason they live where they do and they feared that energy development would permanently degrade the amenities and rural QoL they've come to appreciate (Alter et al. 2010).

expressed concern about the reductions in QoL due to antisocial behavior, drug use, and aggressive, impaired or dangerous driving.

Freudenburg (1986a) concludes that additional social impacts can occur if new employment opportunities attract enough job seekers to lower the community's density of acquaintanceship, or the proportion of residents who know one another, thereby lessening the effectiveness of socialization and deviance control. Changes were particularly evident in control of deviance, socialization of the young, and care for the community's weaker members (Freudenburg 1984). Areas undergoing oil/gas development experience a rapid increase in a transient population using the region as a production site (Christopherson and Rightor 2011). Some changes to QoL are caused by lack of commitment of the transient energy workers to local community life as demonstrated by their physical treatment of the places they lived (Braiser et al. 2014). Brown (2011) found that integration of new workers into the community organizations depend on the workers' level of trust or future reciprocity perceived by the local community. Integration instigates a reciprocal process of forming and strengthening ties. On the other hand, some individuals were outcast due to their job titles and descriptions. This group never formed ties with the community (Brown 2011).

Gilmore and Duff (1974) argue that QoL of the entire population in an energy development region depends on two things: tangibles and intangibles. Tangibles refer to the adequacy of the goods and services available and affordable in the local service sector (including government services). The intangibles describe the morale and attitudes of the population depending on such things as adequate leisure activities, responsive government, and a supportive spirit of community. Therefore, a study on QoL during periods of rapid energy development must focus on both tangible and intangible factors.

3.3.4. Impacts of Energy Development on Different Stakeholder Groups

Overall measures of economics such as income and job creation beg the more important question of who benefits (Little and Lovejoy 1979). Lease or royalty payments in prime shale development areas of the U.S. amount to several thousand dollars per acre for several years, which can amount to a significant financial payment for mineral rights owners. However, some land owners might not own the minerals under their properties: a situation often called "split estate" (Jacquet 2014). A GIS analysis undertaken by Kelsey, Metcalf, and Salcedo (2012) indicate that ownership of the land in the Marcellus Counties with the most drilling activity is concentrated among a relatively small share of residents and owners from outside. As a result, Kelsey, Metcalf, and Salcedo (2012) contend that energy development presents an economic opportunity for some residents while an environmental or QoL concern for other residents, leading to conflict within many communities (Kelsey, Metcalf, and Salcedo 2012).[44] As a result, the decisions by non-resident owners and by the relatively small share of residents who own the majority of minerals thus can have profound implications for the QoL for everyone else in the community. Residents owning little or no leases or minerals might benefit in other ways. How broad-based these benefits are and how they are distributed among residents is unclear from these prior studies, however, it is important to understand the economic and community implications of energy development, particularly for the majority of local landowners with little land, and for the households who rent. (Kelsey, Metcalf, and Salcedo 2012).

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[44] Half of the resident landowners in the counties together only control 1.1 percent of the land area, and renters had no 'voice' at all. Rather it is the top 10 percent of resident landowners, plus outside landowners (both public and private), who are able to make the major leasing decisions that affect the rest of the community. A little less than half (48.9 percent) of the lease and royalty dollars in these counties will go to the top ten percent of local landowners, while 39.8 percent will go to the public sector or non-resident landowners

Moen (1986) argues that energy development appears to have a negative effect on women in terms of economic disadvantages and isolation. Similarly, Ryser and Halseth (2011) found that low-income senior women living alone experience higher housing costs, retrenchment of health care, and lack of other service supports, compared to other senior groups. Comparatively, Freudenberg (1981) analyzed the gendered effects of boomtowns and argued that while most of the literature assumes negative impacts of boomtowns on women, a closer look at the data actually suggests that in terms of adaptation women were possibly doing better than men. Similarly, Brown et al. (2005) found substantial evidence that being attached to one's place through ''thick and thin'' helped residents subjectively adjust to the disruptions. As a result longer-term residents maintained the highest levels of community satisfaction over the entire roller-coaster ride of the boom-bust-recovery cycle,[45] where women and older community members appeared to be the least affected by the disruption. Freudenberg (1984) also documented significantly lower evaluations toward the community, more negative attitudes toward growth, lower levels of satisfaction, and higher levels of alienation among adolescents during periods of rapid growth, which were predominantly based on social and cultural reasons. As a result, it's clear that boom impacts/changes doesn't equally affect all the community members.

Oil/gas industry has a wide variety of housing needs with varying time frames. Worker housing needs are met with hotels, company sponsored temporary workforce facilities (often called man camps), campgrounds, available single family homes, and community's rental

[45] Three of the four indicators of community satisfaction and social integration considered in Brown et al.(2005) either returned to or exceeded pre-boom baseline levels 20 to 24 years after the initial data collection point. As a result, Brown et al. (2005) proposes a boom-bust-recovery cycle.

housing stock (Maki and Leistritz 1981; Williamson and Kolb 2011). The shortage of available housing stock and rapid increase in demand leads to a swift increase in rental prices. While the rise in rental prices is appreciated by investors, it's a very different story for renters (Ennis et al. 2013). The limited supply of housing and the increased demand due to the growth in the Marcellus Shale industry have resulted in rental rates that have made housing unaffordable for over 58% of the County's households, especially households with low to moderate incomes (Lycoming County 2012).

The negative housing impacts are felt heaviest by those living at the economic margins: the elderly and other low income individuals (primarily predevelopment residents of the area), and newly, the working poor (Maki and Leistritz 1981; Williamson and Kolb 2011). Traditionally the most vulnerable are those experiencing unemployment or living on low incomes. Arguably this group will grow to include people on middle incomes, who are simply unable to afford the rents as housing costs escalate (Ennis et al. 2013). On a similar note, Schafft et al (2014) shows that school personnel and longtime residents found themselves displaced from rental housing and were forced to ''double up'' with friends or family to make it work, in Pennsylvania's Marcellus Shale region.

Summarizing the above it can be stated that the impacts of rapid energy development affect stakeholder groups in many different ways based on several factors. These differential impacts generate important implications for QoL perceptions of the stakeholder groups. A thorough understanding of different QoL perceptions of different stakeholder groups would enable development of strategies that aim to improve the QoL of stakeholder groups that are negatively affected by rapid energy development.

3.4. Methodology

The aim of this study is to understand the effect of the oil boom on QoL in western North Dakota. The geographic area of the study was defined as the 19 oil and gas producing counties in North Dakota as outlined by the ND Association of Oil and Gas Producing Counties. QoL is contextual and bound in the space and nature of the setting. Therefore, a methodological approach that provided the flexibility and adaptability needed to delve and explore the indicators that undergird QoL was required. A survey of literature provided certain guidelines for the study design. Previous studies such as Farquhar (1995), Rice et al. (1985), Narayan et al. (2000), and Leimann (1999) were used as starting points for designing the study.

In order to gain a fundamental and preliminary understanding of the setting, documentary/ content analysis was undertaken as a preliminary effort. The *Williston Herald* is one of the premier and widely read local newspapers in the area. In addition to the print edition the paper is also made available online, enhancing the paper's accessibility to stakeholders. Online visitors to the paper's website can express their views, concerns, and reactions to the articles through commenting. The opinion articles section, which comprises of columns, editorials, and letters to editor presents very useful data for analysis. As a result, 512 letters to the editor, published during the period 01/01/2010 to 12/31/2012 and 3877 online comments made by anonymous visitors in the opinion article section were manually coded and analyzed. This preliminary effort provided guidance to: (1) design and development of questionnaire used in the study; (2) set the scope and boundaries of the study; (3) identification of key informants and prominent people in the community as potential participants; and (4) construct a preliminary understanding of QoL in the context of western North Dakota.

Coding of the articles and online comments provided valuable insights. For example one of the letters to editor stated:

> "Residents of western North Dakota are fed up with "man camps," unsafe communities and traffic, outrageous rental rates, and unsightly impacts to the very land which supports every aspect of life in western Dakota. Did any of the state "leaders" bother to ask if we WANTED to live in an "oil patch" no matter the impact on our way of life?... Most of us longtime Dakotans kind of liked what we had before this extreme "boom," namely the blue sky, good roads with light traffic, an agriculturally driven economy along with modest oil activity."[46]

Letters such as these and the online comments on these letters provided a preliminary understanding of the context of QoL in western North Dakota.

The letters and comments highlighted the status of housing as one of the major factors affecting QoL as numerous articles addressed the issue of soaring rents and effect on lives of renters. For example one letter to editor by a wife of an oil field worker stated:

> "The cost of rent is crazy! I recently read an ad for a five-bedroom mobile home for $8,500 per month!!! Who can afford this? No one can afford to pay these astronomical prices without compromising their family's welfare. Most could not afford to bring their families to Williston due to the cost of living. It is really sad. I appreciate North Dakota for making a better life for my family, I just wish we could be together."[47]

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[46] Heiser, J.A. 2012. Fed up with the Oil Boom Way of Life. *Williston Herald*. Posed online: January 24, 2012.
[47] Murdock, A. 2011. Rent Prices Keep Families Apart. *Williston Herald*. Posted online: December 23, 2011.

Several other letters and comments explicated the impact of rent on seniors, service industry workers, and public employees. In addition review of QoL literature outlined that differences in income or employment status is a strong factor that causes differences in perception of QoL. The letters and comments supported this fact. For example one letter stated:

> "People who do service jobs just can't afford to live in Williston or the surrounding area anymore. Lots of folks are not willing or ABLE to work the long, hot, cold, tiring hours required in the oil patch. And let us face it: We need waitresses, gas station attendants, clerks, CNA's, janitors, stock people and other service workers. And they need places they can afford to live and wages that will allow them to pay the upped prices."[48]

As a result, it was possible to identify status of housing as indicated by differences in cost of living and status of employment as indicated by differences in income as two factors that highlight QoL differences among stakeholder groups. The other QoL indicators emerged as the study progressed.

This study's data was also gathered through 89 in-depth, semi-structured, open-ended, questionnaire based face-to-face interviews, first-hand observation of behavior, and interactions. Participants represent residents living in conventional community housing compared to people living in workforce housing, hotels, or other temporary housing.[49] The questionnaire was reshaped and fine-tuned as the interviews progressed. Each interview lasted between 1.0-1.5 hours and was conducted during June-August, 2013. Field notes were taken to understand the

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[48] Rasmussen, J. 2011. Service Workers Need to be Able to Make a Living, and a Home, in Williston. *Williston Herald*. Posted online: September 9, 2011.

[49] Most people living in temporary housing represent transient workforce. Transient workers work on a schedule where they work few weeks and then go back to their home communities or families living elsewhere during days off and holidays. Therefore, these people are in western North Dakota for work and don't become engaged or integrated into the community fabric.

setting and context of the interviews. Participants were recruited using several methods: (1) key community informants identified during pre-study efforts, (2) university extension service in western North Dakota, (3) personal acquaintances of friends and family, and (4) snowballing off of participants in the study or chain/referral sampling. The study population was left unspecified and interviews were continued until reaching a saturation point at which no new information was forthcoming. Participants were encouraged to express their ideas and thoughts freely with guaranteed anonymity. Table one summarizes the characteristics of the participants. The interviews were transcribed, and then analyzed using qualitative/ inductive coding and analysis methodologies.

The inductive and qualitative data analysis method involved identification of QoL indicators and construction of domains that constitute the QoL of different stakeholder groups into a holistic framework. Therefore, a two-tier coding approach was adopted. At the primary level data was coded (structural coding/open coding) to identify QoL indicators with respect to the domains. Previous studies such as Rosen (1979), Lee (2008), Sirgy et al. (2010) were used as guideline for coding and organizing data to identify QoL indicators. At the secondary level data was coded (thematic coding) to show how participants evaluated their QoL with relevance to indicators under each domain. The data under each domain were assimilated to represent major themes and consistent patterns, which led to the identification of stakeholder groups and impacts that affects everyone. For example oil industry workers, mineral rights owners, and business owners expressed very positive evaluations on income and economic opportunity, while seniors and people working in the non-oil service industry expressed lack of sufficient income. However, within the former group, oil industry workers and business owners expressed considerably different evaluations in terms of general satisfaction and conditions of work. Within

the latter group people living in rented housing expressed different QoL sentiments compared to people who owned their home in terms of cost of living.[50] Recurring major themes among these stakeholder groups enabled the identification of QoL indicators that highlight differences in QoL perceptions among different stakeholder groups. The findings and interpretations were cross-checked with community members who were not participants of the interviews to ensure pertinence and validity.

3.5. Findings

Four broad domains that represent QoL in western North Dakota emerged through the data: family experience, work experience, social experience, and community experience. A total of sixteen QoL indicators were identified under the four domains. These indicators represent both personal and place related characteristics. Within each domain, QoL indicators related to the changes caused by the boom overshadowed or dominated other individual level QoL indicators such as differences in health, age, or marital status. Analysis of participant comments clearly shows that the oil boom is the most significant phenomenon affecting the resident's QoL.[51] Table three outlines the indicators that constitute each domain.

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[50] Several participant comments are provided under each stakeholder group to describe the evaluations.

[51] Although other factors that represent individual level differences such as marital status and health were expressed during the study, participants didn't view them as major factors affecting perceptions of QoL and were not considered within the scope of analysis.

Table 3. QoL Indicators Identified Under Each Domain

Domain	QoL indicator
Family experience (4 indicators)	Level of safety and security within the community Presence of good schools and other necessary resources Ability to spend quality time with the family members Nature of relationships that existed within the family unit (Out/in migration of family members)
Work experience (4 indicators)	Level of income and economic opportunity Range of job opportunities available in the community Career advancement potential, General satisfaction with work
Social experience (3 indicators)	Nature of relationships and networks that exist within and among the community members Level of trust and unity in the community Density of acquaintance
Community experience (5 indicators)	Infrastructure resources available in the community (housing, roads, parks, and other infrastructure) Availability and accessibility of Public services (law enforcement, education, health related services etc.) and private amenities (business choices such as retail, dining, childcare, and recreation etc.) Community vitality and population dynamics (population dynamics and pace of change in the community) Cost of living Quality of the surrounding environment (quietness, serenity etc.)

Figure 7 presents the framework constructed to understand the oil boom's effect on the QoL of different stakeholder groups in western North Dakota. Figure 7 indicates the conditions that constituted QoL in western North Dakota and the changes caused by the boom. Some

conditions directly affected the QoL indicators while other conditions had an indirect effect on QoL. For example, escalation in cost of living directly affected the community experience domain. But out-migration of longtime residents affected Qol as it changed the nature of relationships and networks. The following sections further discuss how these conditions affected the indicators and the resulting QoL perceptions.

As figure 7 indicates, differences in perception of QoL led to the identification of six stakeholder groups.[52] Data analysis on participant comments revealed homogenous or analogues perceptions of QoL within these stakeholder groups and substantial differences in QoL perceptions between the stakeholder groups. The stakeholder groups are: entrepreneurs and lease rights owners, oil industry workers, non-oil industry workers, senior citizens, home owners, and renters. The first three groups largely exemplify QoL variances caused by differences in income/positioning in the economic structure. Although, the fourth group (seniors) represents age as a factor, a close look at data shows that their QoL is also predicated on income and cost of living considerations. The last two groups largely exemplify QoL variances caused by differences in exposure to the level of local inflation. The proceeding sections describe the framework in detail. But it is important to first understand the rural QoL in the area before the boom in order to comprehend the changes caused by the boom.

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[52] Papageorgiou et al. (2005) used similar stakeholder groupings (land owners and rest of community) in a study of QoL and forest values in rural areas. Ren and Liburd (2012) used stakeholder groups to study QoL in a small island context. Zack (2013) developed stakeholder groups by age, sex, race/ethnicity, and educational attainment in a study of health related QoL. Therefore, contextual based stakeholder groupings are not novel in studies of QoL.

3.5.1. QoL before the Boom

QoL before the boom is the frame of reference for longtime residents. It is the lens through which longtime residents view the changes in the community triggered by the boom. Figure 7 summarizes the positive and negative conditions in the community that affected QoL indicators before the boom. The findings are largely consistent with the reviewed literature under the rural QoL section. Before the boom, many conditions in the community had a negative impact on QoL indicators of the work experience domain such as level of income and range of jobs available. However, the overall QoL was influenced by other non-monetary factors as outlined by one longtime resident:

> "I think we had a real high quality of life here. Even if there wasn't the highest and best employment opportunities people still stayed here because the quality of education was very high. The quality of recreational especially outdoors was very high. The quality of life the community was able to provide in terms of public safety and public services were also very high. So I think that's what kept the people here prior to the boom."

The lack of economic opportunity in terms of fewer jobs, few well-paying jobs, and low potential for career advancement fueled out-migration of young people. This was described by one longtime resident:

> "Then people moved out to make better money and there was not much jobs here. Some of my relatives, they go to other states and they had better wages and they had actually got things like bonuses promotions and things like that. Here not so much of those things happened. But people were content and happy with that life."

However, the low wages were balanced by a low cost of living.

Before the boom communities in western North Dakota were viewed as ideal for raising families or retiring by its residents. Indicators such as level of safety, strong close ties that existed in the community, quality of the surrounding environment (small town environment, quietness, and peace of mind), and availability of necessary resources, such as good schools, contributed positively towards family and community experiences as evidenced by a resident:

> "I've lived here with my family for 38 years. Up until about 6-7 years ago this was really good place to raise your children. Very quiet town, everybody knew everybody, it always felt safe, and didn't have to worry about locking your doors and that kind of stuff. It was a safe environment for the kids."

However, out-migration of young family members— as indicated by the nature of relationships that existed within the family unit— negatively affected the family experience of parents that remained in the area as described by one participant:

> "Well, I went to a country school, and that school did close in the 90's. All during the time that I was raised here there was never any growth. I have two sisters, so when my last sister left that was really hard on him [my dad]."

The community experience represented a simpler, less hectic lifestyle. The communities were smaller, had a quiet country town environment with simple community needs (local theatre, community center, local bar, grocery store etc.), low cost of living, and access to outdoors and environmental based amenities (fishing, hunting, hiking, enjoying the environment, etc.) as described by one participant: "the lifestyle was you know more easygoing and slow. The prices they were more realistic. It was just a nice quiet town. I moved here in 1970's and I've been here a long time. I just like the town, I just like the lifestyle." Indicators such as knowing everyone in the community (density of acquaintance), trusting and helping everyone in the community, and

strong close ties that characterized social relationships positively affected the social experience in the community. One of the longtime residents described the social experience as: “the community was built of people that you knew your neighbor. You could go down the street don’t have to worry about locking the doors. You had those friendly hellos. Your neighbor would help you, you would help them. So a friendly community.”

As young people left the area, the population’s average age increased and many small rural communities, especially those outside of hub towns, experienced consolidation of public amenities (health, emergency services, education, law enforcement, recreation etc) and decline in private amenities (businesses, retail, dining, entertainment etc), which negatively affected the community experience. Many communities endured absence or very few additions of construction projects, services, new businesses, new people, and investments in community infrastructure. Overall, family experience and social experience were viewed as domains positively contributing towards QoL while work experience and community experience were viewed as domains negatively influencing QoL.

In summary, although residents did not have many economic opportunities or vibrant communities, they were largely happy and content with the life they had as evidenced by a longtime resident:

> “It was mostly agriculture. The community still had the things that they needed, the schools were there, we had places where we could get our groceries, you could still take your kids to the park, and your friends were still there. It was safe. Life was good.”

3.5.2. QoL Changes Instigated by the Boom

The oil boom has generated several impacts– both positive and negative– that has influenced QoL. Some impacts have affected everyone in the community. The conditions that

affect the entire community are outlined under the community cluster in figure 7. It is important to note that most conditions that affect everyone in the community are non-monetary in nature (except for the conditions influencing work experience). As a result, QoL differences among different stakeholder groups stem from monetary conditions that comprise of both income and cost of living considerations.

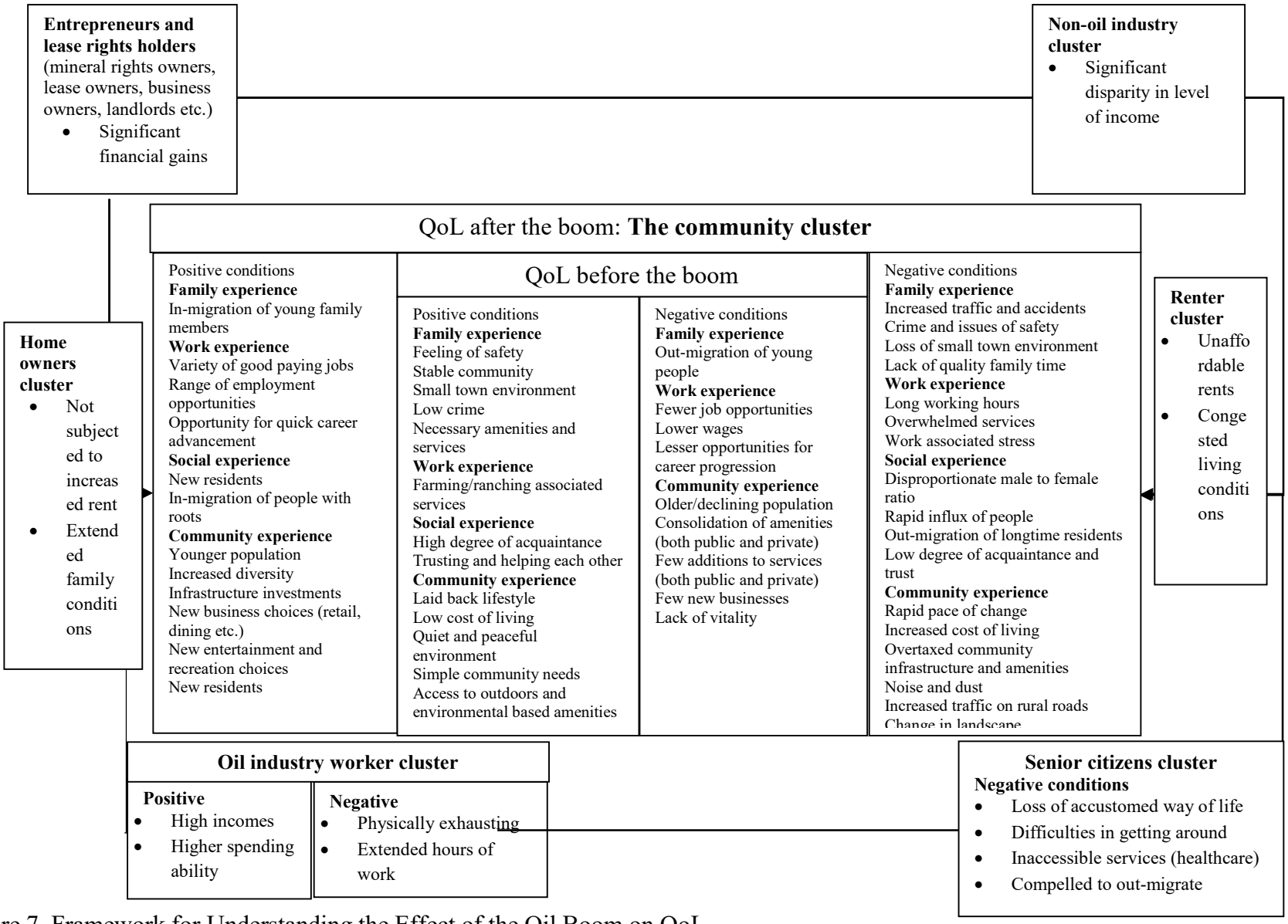

Figure 7. Framework for Understanding the Effect of the Oil Boom on QoL

3.5.2.1. The Community Cluster

Oil boom has created many positive conditions that affect QoL. The biggest positive impact is the favorable work experience as indicated by range of job opportunities, opportunities for career advancement, and income potential. In addition to jobs in the oil industry and associated services, the oil boom has created jobs in virtually every employment sector of the community, as a rapid influx of people swiftly increased the demand for every community service and amenity. One participant described this impact as: "well the good part about it [boom] now is that there is really high paying jobs. Lot of the younger people and some elderly ones have really high paying jobs. So they have money to spend." Conversely, the work experience has been negatively affected by long working hours and work schedules, overwhelmed services, and work associated stress, as indicated by general satisfaction with work. Therefore, similar sentiments to those shown below were expressed by almost every participant regarding their work experience, irrespective of the field of employment:

> "There are times when I think I like things to slow down. So I'm 46 and I wanna retire because it's been so frenzy I'm just ready to be quiet for a while. Its work related stress. There is no way to work a 40 hour job when you're out here. I mean no body works 40 hours. Everyone's got extra work."

Community experience is another domain that has been positively affected by the boom as indicated by community vitality. Communities that experienced declining populations for many years are experiencing a rapid influx. Most of the incoming people are younger, reducing the population's average age. The incoming people are from different cultures and ethnicities, bringing with them diverse food choices, arts, and ethnic experiences to what were once homogenous communities as explicated by one resident: we have more people with diverse

backgrounds. You know, you see what used to be all white people essentially and now you see other people and that's nice. I mean I like that." The boom has also increased the infrastructural resources and amenities available in the community as evidenced by an increase in new infrastructure investments, new businesses, entertainment and recreation choices (new parks and updated park equipment), as outlined by a resident:

> "That's the good part of the boom. We're starting to get in some things we needed. We are getting in different business places, we are getting in more motels, apartments. We are getting in many different things that will benefit the city in the long run."

The positive conditions of the community experience have been compromised by several negative conditions. Indicators such as: increase in cost of living,[53] overtaxed community infrastructure (such as crowded schools, roads, and emergency services), and too few amenities with too many people using them (such as restaurants and health care) has negatively affected the community experience. Increased demand for virtually every community amenity/ service has made accessing services such as healthcare, daycare, and social services a considerable challenge for all community members. Although people have experienced higher incomes, the increase in cost of living has set-off the positive effect on monetary QoL that is based on income and economic benefits:

> "The negative side of it to me is cost of living. It's expensive to live here. I wish it was a more even, where everybody would say I do have an opportunity to financially advance myself because of the opportunities the oil is providing, but really lot of people don't have extra money. It costs that much to live. It's a stress for people because they look at

[53]Factors or sequence of events that have caused increased cost of living including rent are discussed in detail in our other research work on socio-economic system of the boom.

that and say well I'm making more money but I'm not really taking and putting more money away."

Furthermore, decrease in quality of the surrounding environment (because of noise, increased traffic on rural roads, dust, and rapid pace of change), has negatively affected the community experience of people living in the country outside of hub towns. Although the traffic might not be heavy compared to traffic in a larger city or metro area, the change is substantial as perceived by those accustomed to very little traffic. The transient nature[54] of the workforce decreases the level of commitment and treatment of the community as a place of home where the communities become merely a place of work. The lack of commitment and concern for the community can lead to irresponsible acts (littering) and behavior (bar fights, reckless driving, etc.) that affects the community experience.

The social experience domain has been positively affected by in-migration of people with local roots and new residents to the community. In-migration of people with local roots have re-established their friendships and social relationships. Comparatively, disruption to social networks that existed before the boom, lack of trust and unity, and out-migration of longtime residents has negatively affected the social experience. For example, one longtime resident stated*:* "I do think people are not quite as trusting as they were. I like to think that people are trying to accept. There's things you don't like. There's more people there's more crime. So it's just gonna happen." In addition, busy work schedules and stress does not allow sufficient time for socializing. Residents no longer know most other residents in the community (low density of acquaintance), which was not the norm before the boom. A disproportionate male to female

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[54] Workers who are in the community for a short period of time and move away or those workers who go back to their home communities during days off and holidays

ratio, has also affected the social experience of especially females. One longtime female resident outlined that:

> "Now people don't go out to the bar or places to socialize as they used to. The influx of people has affected that tremendously and especially the influx is a very high percentage male so if you are a lady, we girls used to get together and have girls night outs or go out and have dinner or just have fun. Now you can't do that so we just gather at each other's places. So if you are a girl you feel it. I hardly go out now."

It should be noted that the social experience domain is the only domain that demonstrates differences in perception of QoL based on gender, possibly because of the disproportionate male-female ratio.

Western North Dakota was considered as an ideal place to raise a family by residents before the boom. In-migration of young family members has positively affected the family experience domain as parents are happy to have them back in the community and as a result the strength of relationships within the family unit has improved. However, several impacts have caused a negative influence on the family experience as indicated by safety and security concerns (because of increased traffic and accidents, loss of small town environment, increased crime). Additionally, the extended work hours do not permit families to share a lot of time together. In a study by Archbold (2013) on crime and policing in western North Dakota, 66% of the law enforcement officers/deputies stated that crime in their communities has increased. Irrespective of whether the increase in crime is proportional to the increase in population, residents do not feel the same about safety in their community as they did previously as described by one participant:

> "Prior to this time, your wife and your kids could go out and play virtually any time of the day without any problem. But now you realize the things are not the way as they used to be. You have to be cognizant of what's going on around you. Geographically and physically we are a small town but we have all of the major city problems. You see a lot of people in the streets, you have no idea who they are."

Overall, work experience and community experience were viewed as domains positively contributing towards QoL while family experience and social experience were viewed as domains negatively influencing QoL, which is a complete reversal of the perception of domains before the boom. Next sections describe the differences in income or positioning in the economic structure and differences in cost of living that leads to differences in QoL among heterogeneous stakeholder groups.

3.5.2.2. Entrepreneurs and Lease Right Owners Cluster

22 participants of the study fell into this cluster (14- mineral rights owners and 8-business owners). All of the 14 mineral rights owners were longtime residents and 2 business owners were newcomers to the community. In terms of income and economic opportunity this stakeholder group has experienced substantial gains because of the oil boom. As a result, their monetary QoL has substantially improved. For example one mineral rights owner commented: "when the land men started showing up the leases were anywhere from $10 to $50 an acre. Now we're here the leases are high as $1,000 and better." The oil production in the Bakken shale increased from 523, 682 barrels in 2003 to 284,554,268 barrels in 2013. This increase in production within a decade also reflects the level of increase in royalty payments for mineral rights owners. For some mineral rights owners who are also farmers, oil income has supplemented their farming/ranching income. However, participants of this cluster are negatively

affected by the conditions identified under the community cluster in terms of change in nature of social relationships and the surrounding environment.as described by one participant:

> "We got that oil lease money and they paid us for it and it helped me put a down payment on my house that would allow me to stay here. I got friends that had mineral acres and they're rich people now and lot of them have left. They don't live here anymore. They are still getting the money but they don't live here anymore. It's not the style of life they chose to live."

Although business owners benefitted financially, general satisfaction with work was negative as described by one business owner: "we have more business. But we're all working harder and longer. If you're running a business you're picking up the slack because you don't have enough employees." Overall, participants in this cluster viewed their QoL in a positive perception as the financial benefits compensated for some of the negative impacts on QoL.

3.5.2.3. Oil Industry Worker Cluster

24 study participants were employed in the oil industry or associated industries such as trucking (21 male and 2 female: one working as a truck driver and other as an engineer).[55] People working in the oil industry or associated services enjoy high incomes. For example the 2014 average annual wage in the Mining, Oil and Gas Extraction industry in McKenzie County, which is the leading oil producing county in North Dakota was $100,516. [56] But most oil jobs are physically exhausting, require long hours of work, and demand specific training or skills, which negatively affected the general satisfaction with work. The high incomes provide the ability to

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[55] Four participants who worked in the oil industry were also landlords who owned rented apartments.

[56] Assumes a 40-hour week worked the year round. Average hourly wage was $48.33. Source ND Labor Force Intelligence.

spend that improves the monetary QoL that positively affects the family experience domain. One of the truck drivers working for the oil industry, who was also a new comer commented:

> "I first got few jobs at fast food places. Three weeks after I got a job at a man camp. I worked there for six months. It was alright. We talked to people in the oil field and their salaries and schedules like two weeks on and one week off making quadruple of what we were making at the man camp. I had my two weeks off so I went to truck driving school and got my CDL. In two days I filled almost 59 applications. It helped us out. You know pay off all my debt get some money saved up. So when I'm home I have more money and so you can do stuff with your kids and I have that freedom now."

However, the long hours of work create stress, pressure, and a lack of time to spend with the family that negatively affects the family experience domain as described by the same worker: "but I miss out on certain events like thanks giving or other things. You know my older one gets kind of upset about me leaving and all that. You just got to man up and do whatever you got to do." Similarly a wife of an oil industry worker commented:

> "At first [my husband] really liked his job, I think now going on for some years of working almost every day it's starting to wear on him. I don't know how he lasted this long but that's hard. But it's rough when you can't have fun and play together as a family."

Overall, almost all study participants working in the oil industry viewed their high incomes as a compensating variable for the other negative impacts indicated by general satisfaction with work and lack of time to spend with the family. As a result, their overall perception of QoL was positive.

3.5.2.4. Non-Oil Industry Cluster

37 study participants comprised the non-oil industry cluster (14- public service,[57] 11-non-oil service,[58] 9-farming and ranching,[59] and 3- other). There is a considerable disparity in income between this stakeholder group and the oil industry worker cluster. For example the 2014 average annual wage in McKenzie County for Educational Services, Food Services, General Merchandise Stores, and Justice Public Order and Safety Activities was $40,612, 30,576, $23,244, $55,640 respectively.[60] Although non-oil workers enjoy increased incomes compared to conditions before the boom and compared to elsewhere in the country, the drastic increase in the cost of living[61] (especially if they were living in rented housing), negated any improvement in QoL because of increased income. An employee working for the parks and recreation commented:

> "Before the boom I was a cook. There was good jobs and it didn't cost $3000 for rent. You could get a three bedroom for $400. So you didn't need to make $20 an hour. You know $12 an hour $10 an hour you made a good living."

Additionally they're also working long and extended hours[62] or in some cases employed at 2-3 jobs in order to afford the cost of living, which has negatively affected their general satisfaction with work.

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[57] City/county government workers, nurses, social service workers, teachers, law enforcement, emergency workers, and maintenance workers etc..
[58] such as retail, dining, recreation, childcare, and other services
[59] 9 farmers out of the 18 farming and ranching participants of the study owned mineral rights or other lease rights and were included in the entrepreneurs and lease right owners cluster
[60] Source: ND Labor Force Intelligence
[61] For a detailed discussion on reasons for increase in cost of living please refer our research on socio-economic system of the oil boom.
[62] For example in the case of public service workers such as law enforcement officials their work load has drastically increased.

In addition, many study participants in this cluster highlighted the "costs" they have to bear as a result of energy development without any recompense. These costs mainly represented traffic and safety concerns and inability to access services, which negatively affected the family and community experience domains. For example one longtime resident in this cluster commented: "there are a lot of people here that are not benefitting at all from the oil boom but they're all paying the price for the oil boom for everything. It's real frustrating." One longtime resident described summarized the situation:

> "One of the things that concern me is the new poor. We talk a lot about the new wealth in this area, but we've also seen a new poor developing in our community. It's the new working poor that are the integral service workers. So anybody working in the service industry, I don't know how they are doing it, they can't afford it."

The comparatively low incomes, long hours of work, and having to bear many other negative impacts without any recompense led to an overall negative perception of QoL in this cluster.

3.5.2.5. Senior Citizens Cluster

16 participants in the study had reached the age of retirement. However, only 4 participants were actually retired. This is another stakeholder group that has been negatively affected by the oil boom. All the employed elderly stated that they would like to retire, however, the cost of living didn't allow them to do so. None of the seniors in the study benefitted from minerals or lease rights.[63] Seniors on fixed incomes do not have the capability to adapt to the increased cost of living. In addition, seniors living in rented housing are negatively affected by increased rents.

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[63] If they had benefitted from minerals or lease rights their perception of QoL might have been different. This would be an interesting dimension to explore in a future study.

Seniors are also affected by difficulties in getting around due to heavier traffic (which affected safety and security), loss of way of life they are accustom to (which affected the nature of relationships and networks and quality of the surrounding environment), overwhelmed community amenities and the resulting waiting times (which affected the accessibility of services such as healthcare). All of these factors negatively affect their social, family, and community experience. These conditions have compelled or forced some seniors to leave the community. A senior described the changes in life they are facing:

> "I probably would have retired here and lived the rest of my life here. But the living expenses is a key thing. The traffic has changed dramatically here, especially when you get older it becomes a problem. Seniors are really having a tough time getting around. Just the general QoL is not what it used to be. It isn't that quiet small town feel we used to have."

As a result, all the participants of this cluster expressed a negative perception of their QoL.

3.5.2.6. Home Owners Cluster

46 participants of the study owned the home they lived. Home ownership[64] is seen as the biggest factor determining the level of exposure to cost of living or local inflation. If a person owns the house in which he or she lives, he or she is exposed only to the increase in general cost of living as outlined by a home owner: "if you owned your home pre-Bakken you are ok. Post-Bakken you gotta to do a lot of homework to be successful to stay here." A person living in rented housing has seen his or her rental costs increased by two or threefold in some cases, which has substantially increased the cost of living for people living in rented housing. Owning a home,

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[64] Or housing being paid for or provided by employers.

especially prior to the boom, insulates a person from such negative impacts or substantial increases in cost of living. For example, one participant commented: "the oil has not adversely affected us at all we had our house. We have wells that's allowed us to more things." Similarly another new comer stated:

> "I moved here five years ago. My wife has a job at the school. So it's been really easy for us jobwise and being a pastor to the church provides housing so we had an apartment at first and now we have a house. So that's been a relief for us."

Additionally, prices of most newly constructed single family homes are over $250,000 and are not easily affordable to many people working in non-oil jobs. Therefore, owning a home in present housing market conditions is a considerable challenge for many new residents, especially if they are not working in the oil industry. As a result, many young families or residents have had to move in with their parents or share housing with several others to make it affordable. A new comer who works for the county stated:

> "My husband is from here and he was in the oil industry. We tried to make it long distance for a while. We were talking about it for quite a while but we didn't know where we were going to live. My husband used to own a home he bought it for $40,000. I would say may be 2005 and it sold for like $120,000 or so just a few years later. Luckily a house opened up in his family and somebody passed away unfortunately. We were fortunate enough to live in that house."

The increase in extended families living in the same house is not customary and negatively affects QoL. A resident described the situation:

> "You know for [we] that own a home, we are very lucky that we own our place. But people that rent, the rent you have to pay is one of the most horrendous things here,

especially if you are young and trying to make a living, and if you don't work in the oil field."

The overall QoL perception of this cluster was mixed. If the participants owned their home and also enjoyed financial benefits (such as mineral leases), their perception of QoL was positive. But if they worked in the non-oil service sector their perception was negative. However, all the participants in this cluster agreed that if they had to live in rented housing compared to living in owned housing, their QoL would be much worse, which differentiated this cluster from the renter cluster.

3.5.2.7. Renter Cluster

24 participants of the study were living in rented property. They were either seniors, public service employees, or non-oil service industry workers. [65] The residential property types included single family homes, apartments, mobile homes, and trailers. As explained above this is a stakeholder cluster that has been negatively affected by the oil boom. Many renters have experienced a two or three fold increases in their rents as explained by one renter:

"I had a two bedroom apartment building that was paid $475 a month. I got a notice that said next month your rent is tripling. People who were paying $600 a month their rent was going to $2,000 a month or $2,500 a month. I know many people who had to leave here because they could not afford the rent."

A social services director in the area noted that:

"We have number of people that come into apply for our SNAP assistance, mostly for food stamps. They're making 3000 to 4000 a month but [they say] I'm paying 2500 or

[65] All of the oil industry workers claimed that they received employee provided housing or housing assistance and as a result they didn't have to live in rented property.

> 3000 in rent I don't have money to put food on the table and those people we can't help. They're over our gross income limits. They have fairly good jobs but still can't make ends meet and those are the really tough ones too."

Positive impact on QoL by higher incomes were negated by extremely high rents and the resulting high cost of living led to a housing induced poverty situation, which negatively affects QoL. As a result, some renters have had to share living arrangements with several others, or live in substandard conditions, which negatively affects their QoL. Instances of people sharing a home with 6-12 others were revealed during the interviews as explicated by a manager of a non-oil service industry business: "Well [my employees] live in interesting situations. We've had people living in campers living in houses with 12 other people because that's the only way that they can afford rent. Just all kinds of odd housing arrangements."

Another renter who was also a new comer commented that:

> "The problem is the housing. Housing is outrageous. You have to have a very good job here to even be able to survive the housing. I'll admit we're paying $2,400 a month and we [as a family] make very good money. But a large proportion of that goes out. That's why we're in the process of trying to buy a house."

Overall, this cluster had a negative perception on QoL largely based on the high cost of living.

3.5.2.8. Individual Perception of QoL

Conditions created by the boom is the biggest phenomenon affecting QoL in the context of western North Dakota. Therefore, although there might be other individual or personal differences (based on differences in health, age, and marital status etc,) that affect QoL, sufficiently adequate, useful, and accurate descriptions of QoL can be developed by examining stakeholder clusters. Figure 7 is organized in such a way that perception of QoL of stakeholder

groups, change from positive to negative when moving from left to right: the stakeholder groups on left have a positive perception of QoL compared to stakeholder groups in the right. But the clusters describe QoL at a group level.

In order to understand QoL from a personal/individual perspective it is important to consider how many and to which clusters an individual belongs to. For example, examination of figure 7 shows that a mineral rights owner living elsewhere might enjoy the best QoL: mineral rights provide financial benefits while the owners do not experience the negative impacts outlined under the community cluster. Mineral rights owners living in the community are also affected by the negative factors identified under the community cluster. As a result, their perception of QoL is a tradeoff between positive (economic and other positive factors outlined in the community cluster) and negative factors of the community cluster. Comparatively, seniors living in rented housing or service industry workers living in rented housing expressed the most negative perception of QoL, as the participant comments below indicate:[66]

> "I think the community needs to worry about seniors. When we create a scenario, we damn well know that they can't compete. They are too old to go get a job, or they worked long enough. But don't create a scenario that they can't do anything but fail."

Another longtime resident working in the non-oil service industry and living on rented housing described her QoL:

> "I'm just one of those average working people that doesn't work in the oil field. So even for me it's really hard. You can't make a choice on this [housing] you need to have a bed.

[66] Participants of Anderson and Theodori (2009) also expressed similar sentiments.

But you can make a choice on quality of living that I settle for, and that's what I've had to do."

3.6. Discussion

Figure 7 highlights three points. First, there is a clear difference in perception of QoL between those who are in a position to benefit financially from the boom and those who are not. Second, there is a clear difference in perception of QoL between those who are subjected to an escalation in cost of living (especially housing) and those who are not. Third, a comparison of conditions in the community cluster before the boom to those after the boom's beginning indicates that the boom has created several new conditions at the expense of several other positive Qol conditions. These three points are critical for understanding the oil boom's effect on QoL. Further research should examine the validity and applicability of these three points in the context of other oil/gas booms. The framework presented in Figure 7 also highlights the conditions that constitute QoL in a rural setting. Most areas currently experiencing unconventional oil/gas development based on fracking technology in Pennsylvania, Montana, Wyoming, or western Texas, are rural areas. Most of these rural communities experienced similar problems such as population decline and lack of economic activity before the boom. Therefore, the framework presented in this study outlines broad implications that could be useful as a departure point to study the effect of oil development in those communities.

It must be noted that lack of safety and security, low level of trust and unity among community members, and change in nature of relationships within the community were highlighted by all the longtime residents as indicators having a negative impact on QoL. The three indicators are interrelated and interdependent. These concerns were raised by all the

longtime residents irrespective of whether they benefitted from the boom or not. One participant noted that:

> "I think the nature of people that have been here that are from here is to trust everyone. But I think we've also come to the point where now people lock their homes lock their vehicles and they're protective of what they have. Not because they don't trust people but because there's an element of the unknown here. That never used to be here. It's so fast it's so rapid and there's just not been time to develop the friendships necessary to build trust with new people."

The data shows that the rapid influx of people has affected the gemeinschaft social structures that existed before the boom. As a result, community development efforts must foster better interactions and improve integration among community members to improve QoL.

It is also important to compare these findings with previous studies. Brown et al. (2005) presented evidence that longer-term residents maintained the highest levels of community satisfaction over the entire period of the boom-bust cycle and women and older community members appeared to be the least affected by the disruptions. The study concluded that either being older or being a long-term resident buffered residents against declining community satisfaction (Brown et al. 2005). Although this study focused on QoL, the two concepts have been described to be largely positively interrelated (Krout 1988; Michalos et al. 2006). This study provides qualitative evidence to show that in the context of western North Dakota it is not length of residency or age that buffers residents. According to this study the two main factors that buffers residents are being in a position to financially benefit from the boom and being in a position not to be subjected to escalation in local inflation, especially increases in cost of housing.

During a survey of longtime residents in western North Dakota, Rundquist et al. (2012) found that only 16.45% agreed that the boom has improved their QoL. This study identifies the potential conditions and influences on QoL indicators that undergirds such assessment. Therefore, a follow up quantitative based study is necessary to understand the behavioral implications of different perceptions of QoL among different stakeholder groups (how residents adjust and become attuned). Potential behavior based on QoL would be affected by how individuals prioritize different QoL indicators. For example, higher income or economic security might be more important for some people compared to safety or small town environment. Therefore, future studies should also focus on how different stakeholder groups prioritize QoL indicators as a basis of behavior and decision making.

Gilmore (1976) outlies a "problem triangle" or a path of growth that leads to eventual degradation of QoL during periods of rapid energy development. As population grows at boom rates, existing local services (such as schools, retail choices, housing, recreational choices, healthcare etc.) in the community do not grow as rapidly and the QoL in the community degrades. As a result, it becomes difficult to attract and retain workers (whether its industry workers, restaurant workers, or workers maintaining the county roads and bridges) necessary to support the economic growth. Workers and their families do not want to stay in the community and those who do stay are pirated back and forth among employers. Employee turnover rates and absenteeism go up rapidly. Industrial productivity and profits drop. In addition, social malaise or chaos causes private investors to be skeptical and unwilling to invest in commercial facilities, housing, or the other private sector needs. Thus the situation is back where it started in the problem triangle, with local services and facilities finding it even harder to keep up with increasing population and demand (Gilmore 1976). Although this model needs to be

considerably updated to reflect the modern energy development and associated conditions it's important to avoid such a path of growth. Similarly, Gabriel et al. (2003) found substantial deterioration in QoL in states that experienced rapid population growth, which was caused by reduced spending on infrastructure, increased traffic congestion, and air pollution. Hence, a lack of investment in public services, community infrastructure, and barriers that inhibit service industry growth would further deteriorate QoL in western North Dakota communities.

This study shows that non-oil service industry and public service workers expressed negative perceptions of their QoL. As a result, if they decide to act on their negative perceptions (which requires further study) these essential services would experience a severe shortage of labor. Therefore, implication of different QoL perceptions cannot be ignored from a community development and planning standpoint as they have the potential to cause significant structural changes (Gramling and Brabant 1986). Therefore, the state and community level policy/decision makers must: (1) invest in infrastructure development (roads, schools, parks and recreation etc.); (2) enhance public services (education, emergency services, law enforcement, health etc.); (3) facilitate and attract new business services (retail, dining, childcare etc.); and (4) improve community integration and relationships to improve QoL in communities of western North Dakota. Findings of this study shows that lack of affordable housing seriously affects QoL of seniors and non-oil industry workers and acts as a barrier for business growth and expansion.[67] Non-oil industry workers perform critical community functions that a community cannot survive without. But North Dakota Century Code, Chapter 47-16-02.1 expressively prohibits rent control, and it could be argued that rent control would negatively affect investor confidence.

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[67] For a more detailed discussion on how lack of affordable housing affects the entire community refer our research work on socio-economic system of the oil boom.

Therefore, further research is necessary to find appropriate mechanisms for development of affordable housing, especially for seniors, non-oil service industry, and public service employees.

The study has several limitations. First, the study didn't focus on QoL of: (1) residents younger than 18 years old, (2) oil industry workers living in worker housing/man camps, (3) transient people, and (4) native American reservations in the area. Freudenburg (1984) found differential impacts of rapid community development during a boom between adolescents and adults. Therefore, future research should focus on impact of the oil boom on QoL of young adults and other stakeholder groups. Second, the study only focused on four broad domains based on the conditions created by the boom. Future research can focus on other important domains such as the environment, community involvement, demographic differences, and other sectors of the economy, such as the effect on agriculture. Although this study did not focus on environment or environmental experience as a domain of QoL, participants raised concerns during interviews on potential impacts to the environment (dust, noise etc) and other natural resources that affects QoL.[68] Other studies such as Anderson and Theodori (2009) and Jacquet (2012) reveal similar environmental concerns during a boom. Therefore, future research could consider the environment or environmental experience as a domain of QoL and examine the effect of the oil boom on the environment and associated QoL.

[68] In this study these were expressed in relation to environmental based recreation and amenities such as hunting, camping etc. But there could be issues on pollution, clean air, and water that must be addressed through a separate study.

3.7. Conclusion

This exploratory study aims to set the baseline and context for subsequent studies on QoL in western North Dakota and other rural communities elsewhere experiencing unconventional oil and gas development. The chapter presents a holistic framework for understanding the effect of the oil boom on QoL of different stakeholder groups in western North Dakota. The framework also captures the contextual determinants of rural QoL in western North Dakota and facilitates comparison of QoL between past and present conditions. The findings show that certain negative and positive conditions created by the boom affects the entire community, whereas other conditions only affect QoL of certain stakeholder groups. The differences in QoL were based on being in a position to financially benefit from the boom and being in a position not to be subjected to escalation in local inflation (especially cost of housing). The findings suggests that community developers, planners, policy makers, and researchers must engage in finding solutions and mechanisms for: (1) affordability of housing; (2) enhancing public services and infrastructure; (3) facilitating private business services and amenities; (4) better community integration programs in order to improve and enhance QoL of communities in western North Dakota.

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4. SOCIO-ECONOMIC SYSTEM OF THE OIL BOOM AND RURAL COMMUNITY DEVELOPMENT IN WESTERN NORTH DAKOTA

4.1. Abstract

An oil boom is a complex social and economic phenomenon. The socio-economic system presented in this chapter is a novel effort to integrate Social Network Analysis (SNA) and boom impacts/changes, within a systems framework, at community stakeholder level. Most boomtown studies focus on longitudinal changes of a boom-bust-recovery cycle or social disruption based approaches. This study is an effort to demonstrate that longitudinal changes or social disruptions of a boom manifest through the interactions and interrelationships between social entities and/or stakeholders acting within the boom conditions and the surrounding conditions.

The socio-economic system presented in this chapter deduces the boom to a system, which provides a useful lens for many other rural communities currently experiencing unconventional oil/gas development in the United States. The socio-economic system highlights five main challenges or factors that need to be addressed through community development strategies: development of affordable housing, investment in community infrastructure, expanding public services, attracting new businesses to the area, and better community integration strategies to build trust and unity within the community. This study is qualitative and exploratory in nature. As a result this chapter explicates the functions, structure, and relationships between system entities in depth to provide a broader understanding of coherence, conflicts, and synergies within a system.

4. 2. Introduction

An oil boom is not a novel experience to western North Dakota. Last oil boom in the area ended in the early 1980's. Since then, the area settled into a largely agricultural based rural way of life. Although there are hub towns like Dickinson, Watford City, Williston, and Minot, they are not large cities, and therefore, the geographic of area is largely rural in context and nature. Most of the job opportunities in the area were in farming/ranching and associated services, public services and parks, or in the few businesses in the area, including some manufacturing. In addition, a minor number of oil production jobs were available, but oil development positions were virtually non-existent. As a result, the area's economy depended heavily on agriculture and the former's culture was pervasive in the inhabitants' way of life.

In the period between the immediately former and present boom, the agricultural industry consolidated as farms grew larger. Large farms mean fewer job opportunities, which resulted in outmigration and a declining population density. Young people, especially, left the area for better opportunities. Although some people who had moved away decided to return to raise their families, settle down, or retire, overall there was a negative net population growth. As a result, the proportion of elderly in the community increased during the last two decades. Within this community context, Rathge, Clemenson, and Danielson (2002) identified issues such as long-term county viability due to continued rural depopulation, increased travel times, decreased availability of goods and services, school consolidations, adequate healthcare, loss of human capital, and meeting the needs of a growing elderly population as the important topics of debate among policy-makers of western North Dakota for the foreseeable future.

These foci have undergone dramatic changes since oil drilling and associated industry activity in the area began to rapidly increase[69] around 2005, resulting in a full scale oil boom. The boom has significantly changed the social and economic trajectories of the communities in western North Dakota, and it is not possible to revert back to the social and economic equilibrium that existed before the boom. Hence, the communities are in a status of transition or a process of development to a new social and economic equilibrium.

Gilmore (1976) presents a "problem triangle" or a systemic path of a boom town that leads to degradation in community quality of life and ultimate failure. As population grows at boom rates existing local services[70] fall short of need, which degrades the quality of life in the community. Therefore, workers and their families do not want to stay in the community and some of those who do stay are pirated back and forth among employers. As a result, it is difficult to attract and/or retain the labor force necessary to support and service the economic growth, whether it is industry workers or restaurant workers or workers maintaining the county roads and bridges. In addition, social malaise or chaos causes private investors to be skeptical and unwilling to invest in commercial facilities, housing, or the other private sector needs. Thus the situation is back where it started in the problem triangle, with local services and facilities finding it even harder to keep up with increasing population and demand. Consequently, Gilmore (1976) argues that energy resource development at an accelerated pace entails a very complex system, which needs to be described and understood to keep boom-type problems from disrupting both the social environment and the growth management efforts. Although this model needs to be

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[69] Increase in activity was caused by high oil prices and new oil drilling or fracking technology
[70] Including private services such as retail, housing, healthcare, dining, recreational opportunities, and public services such as law enforcement, education, city services etc.

significantly updated and modified to represent modern energy development and associated conditions it's a vital starting point as many local services in western North Dakota communities are struggling to keep up with the pace of economic growth. By perceiving the boom as a socio-economic system this study tries to position the communities in western North Dakota on a path of development that envisions the boom as an enabling mechanism to build better communities compared to what existed before the boom.

Vidal and Keyes (2005) present three characteristics of a community development system: functions, structure, and relationships. The first characteristic or the functions relate to specific things the system provides, such as jobs and economic opportunity. The increase in oil activity has created many jobs and has spurred economic growth in western North Dakota (Bansund and Leistritz 2011). The second characteristic (or structure) relates to vertical and horizontal network of organizations through which those functions are performed. The oil industry cannot exist on its own. It depends on employees, who in turn require a range of other business (dining, retail, recreation etc.) and public services (education, health, law enforcement, emergency services etc.). The industry also has to share the community infrastructure such as roads and housing, with other community members. Federal, state, and county governments and agencies are responsible for governing the whole process through laws and regulations, and facilitating development through providing funding for public services such as education and law enforcement. Therefore, the boom has generated a network of interrelated and interdependent organizations. The third characteristic outlined by Vidal and Keyes (2005) refers to the relationships or ties among the system participants.

Vidal and Keyes (2005) argue that new functions created by any new activity drive the types of structures and relationships that are needed for community development. The process of

industrialization ignited by the oil boom in these rural agricultural communities will require and with time establish new structures and relationships. As a result a thorough understanding of the functions, structure, and relationships of the boom is needed to craft appropriate community development strategies. To fulfill this need, the socio-economic system presented in this study explicates the functions, structure, and the relationships that exists between the various social entities or stakeholder groups such as the oil industry, residents, seniors, non-oil businesses, new comers, employees etc. in order to facilitate a detailed understanding of the opportunities presented by the boom, the challenges and barriers that inhibit nurturing communities, and outline the solutions necessary to achieve the community development potential created by the oil boom.

Although the above is easy to say, it is far more difficult to achieve. The media reports from the area clearly highlight several negative impacts or challenges created by the boom such as overwhelmed community infrastructure and amenities, issues of safety and crime, and rapid local inflation and many other impacts.[71] Therefore, several challenges and barriers still remain to be addressed and resolved. The socio-economic system analyzes the underlying root causes of some of the main challenges or negative impacts created by the boom and demonstrates how these manifests. Such knowledge would help to develop community development strategies to address the challenges or impacts by tackling the root causes.

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[71] Survey of boomtown sociology, social disruption hypothesis, and social impact assessment literature shows that communities which undergo unconventional energy development generally experience negative consequences in addition to positive impacts. So these negative impacts are well documented in literature (Chambers 1933; Cortese and Jones 1979; Wilikinson et al. 1982; Freudenburg 1984; Krannich and Greider 1984; Schmitz 1995; Brown, Hudspeth, and Stone 2000; Besser, Recker, and Agnitsch 2008; Anderson and Theodori 2009; Brasier et al. 2011; Ruddel 2011).

The socio-economic system presented in this study is a novel effort to integrate Social Network Analysis (SNA), boom impacts/changes, within a systems framework, at stakeholder (group) level to enable community development. This approach complements and contributes to the literature on energy booms in several ways. The findings of this study demonstrate that longitudinal changes of a boom manifest through the interactions, interrelationships, and interdependencies that exist between stakeholder groups and other contributing conditions. As a result the socio-economic system establishes a broader understanding to facilitate community development, planning, and policy formulation during an energy boom. Most communities currently experiencing unconventional oil/gas development based on fracking technology in Pennsylvania, Oklahoma, or western Texas are rural areas (Anderson and Theodori 2009, Jacquet and Stedman 2014, Brasier et al. 2011, Luthra 2006, Perry 2012). Therefore, the socio-economic system presented in this study would provide a useful departure point to study the effect of oil/gas development in rural communities.[72]

An oil boom is a massive socio-economic phenomenon. Therefore, a complete and comprehensive discussion of all its aspects cannot be achieved in one single chapter. As a result the scope of this chapter is limited to a socio-economic system at the stakeholder level, which explicates some of the major social and economic challenges that need to be addressed through community planning and development efforts. The purpose of this chapter is to set a baseline or a fundamental understanding of the boom as a system so that further studies can delve into components and entities within the system and related systems.

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[72] Although differences exist, many rural areas that are currently experiencing oil/gas development endured periods of population decline, aging populations, and lack of economic vitality before development that makes broad inferences possible.

The structure of the chapter is as follows. The literature review section defines the study's important concepts and sets the theoretical framework. The results section first discusses the socio-economic system of the boom and the surrounding related systems and contributing conditions. Second, the socio-economic system is broken down in detail to four cycles that explicate the functions, structure, and relationships that exists within the community stakeholders. These four cycles are: basic boom cycle, social relations cycle, housing cycle, and non-oil industry cycle. Graphical representations of each cycle are presented. The discussion section focuses on the implications of findings on community planning and development, study limitations, and directions for further research. The chapter finishes with a brief conclusion.

4.3. Review of Literature

Systems theory is a well-established theoretical approach in the science, engineering, and other technology related fields. [73] Therefore, the aim of this literature review is to outline the main concepts of systems thinking and its applicability, relevancy, and prior use within a community development context.

4.3.1. Systems Theory and Social Network Analysis

Ludwig Von Bertalanffy (1950), a founding father of general systems theory, defined a system as a "complex of interacting elements…. Interaction means that the elements stand in certain relation" (pg. 143). Gallopin (2003) also claims a system as a "set of interrelated elements (pg. 9)." The elements can be organisms or social entities. Laslo and Krippner (1998) describe a system as a complex of interacting components together with the relationships among them that permit the identification of a boundary-maintaining scheme. Bossel (1999) defines a

[73] For a more technical elaboration of systems theory please refer Von Bertalanffy (1950), Liu (2007), Deng (1989), and Alan (1997).

system as "anything that is composed of system elements connected in a characteristic system structure. This configuration of elements allows it to perform specific functions. These functions can be interpreted as serving a distinct purpose" (pg. 20). Review of the definitions cited above and several others show, in general, that systems are: (1) a unit of wholeness made up of several entities or parts that are interrelated, interlinked, and interdependent on each other based on some considered criterion; (2) organized into a meaningful structure; (3) designed to deliver or perform certain functions or purpose; (4) distinguishable from the surrounding environment.

Social network analysis (SNA) is a theoretical and methodological tool used to analyze the connections and relationships between people, groups, institutions, and organizations. A social network is a structure or map made up of members or entities (individuals, groups, or organizations), which are tied by one or more specific types of interdependency, such as friendship, common interest, financial exchange, dislike, conflict, cooperation, beliefs, sharing knowledge, and pressure etc. (Allen et al. 2008; Lienert et al. 2013; Bassi et al 2014). As a result SNA complements systems thinking and approach (Springer and Steiguer 2011).[74]

A system is engaged in the conversion or transformation of inputs into outputs. An *open system* exchanges energy, matter, and information with the surrounding environment.[75] The *inputs* are the assets and resources brought in to facilitate and to be employed in the processes and activities of the system. The activities, processes, and strategies of the system that are

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[74] Bassi et al (2014) outlines three potential applications of SNA in rural/ community studies: cognitive tool, assessment tool, and awareness tool. As a cognitive tool SNA provides data on the characteristics of an existing relational system, to be used for planning rural development agendas. As an assessment tool SNA helps evaluate projects to foster networking processes and as an awareness tool SNA contributes to enhancing rural actors' awareness of the relational system in which they are embedded (Bassi et al 2014).

[75] No materials enter or leave a *close system* (Gallopin 2003).

engaged in the processing and transformation of inputs are known as *throughput***.** The end results or outcomes of the system processes and activities are referred to as *outputs*. *Feedback* occurs when information is relayed from output to input on system performance.[76] Negative feedback[77] often indicates that a new course of action or change is needed for continued system existence (Kast and Rosenweig 1972; Niehof and Price 2001; Friedman and Allen 2011). The *system boundary* delineates the aspects of a system from those of its environment and other systems, and gives it identity and definition (Laslo and Krippner 1998; Friedman and Allen 2011). The boundary tends to blur as the unit of observation moves from natural and designed physical systems to human or social systems, with their imbedded artificiality, vagueness, or ambiguity. Most human or social systems are comparatively difficult to define as they do not have clear-cut and agreed upon aims or purposes, multiple and overlapping purposes, and even when agreed upon, aims may change over time (Laslo and Krippner 1998).

There are different types of systems. A *white system* is one whose internal characteristic is completely known and system information is perfectly known. Comparatively, internal information of a *black system* is totally unknown to the outside world. However, most systems in the world are neither white nor black systems: they are grey systems (Lin 2010; Liu et al. 2012). Julong Deng (1989) introduced the concept of grey system.[78] A grey system lacks information, such as on structure, operational mechanism, and behavior, which leads to uncertain or

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[76] Von Bertalanffy (1950) also articulated an element he termed the *trigger*: "we may call the element P_s a leading part or say that the system is centered around P_s….a small change in P_s will cause a considerable change in the total system (pg. 150)."
[77] Negative feedback are self-regulating responses that inhibits system performance.
[78] A complete discussion of grey system application and mechanism is not possible within the scope of this chapter as it pertains to mathematical modeling, forecasting, and quantitatively inclined statistical methods.

incomplete conditions. The main objective of grey systems is construction and development of reasonably useful and adequately sufficient logical realities, within the constraints of available information.[79] An oil boom can be viewed as a grey system. The length and magnitude of a boom largely dependents on several known and unknown factors such as the quality and extent of the mineral resource or shale formation, the relative cost effectiveness of extraction between alternative deposits of formations (the Bakken shale, the Maricellus shale, the Ford-Eagle shale, the Barnett shale etc.), the regulatory framework governing the extraction process, the potential returns based on market price mechanisms, and many other factors.

The equilibrium state of relations of a system is driven by the decisions and choices of multiple entities that are involved in decision making. Some are micro-entities who decide on such matters as choosing where to live and work, while others entities operate at a higher level deciding on changes to transport infrastructure or the location of a new development. The series of critical decisions each system entity chooses from several possible alternatives will determine a particular life path or route of progression/digression for that entity. The alternatives available, however, are constrained by the current state or positioning of the entity in relation to the landscape or overall structure of the system (Mitleton-Kelly 2003). When a system entity, such as an individual, group, organization, industry, or economy, is faced with a constraint or a state of disequilibrium[80] it finds new ways of operating as entities are forced to experiment and explore their space of possibilities (Mitleton-Kelly 2003).

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[79] Since the 1980s, grey system theory, models and techniques have been used in hundreds of Chinese cities, counties and provincial-level regions to work out strategic planning of development, economy, and technology (Liu 2007).

[80] Movement away from established norms, practices and state of balance.

4.3.2. Community Development Processes as a System

Although not directly articulated as systems theory, systems thinking is not novel in fields of sociology and qualitative approaches. Weaver (1948) develops the idea of dis/organized complexity. He argues that although a problem of disorganized complexity involves a large number of variables, and each of the many variables has a behavior which is individually erratic, or perhaps totally unknown, the system as a whole possesses certain orderly and analyzable average properties, thereby resulting in organized complexity. Although not termed a grey systems approach, Ragin (1987) articulates a "configurational" approach or a comparative method (pg. 12). The approach involves the identification or definition of relevant causal conditions and different parts of the whole that are understood in relation to one another and in terms of the total picture or package that they form. The general goal is to exemplify how different parts of a case interconnect (Ragin 1987). Ragin recommends this methodological approach for studies that engage case forms and qualitatively inclined contextual examinations such as family systems or cultural systems.

Cook (1994) notes that general systems theory retraces a lot of old footsteps in the doctrine of methodological holism. Therefore, systems approaches or thinking have been used in social research on numerous occasions and contexts. For example, systems theory has been used to study and analyze numerous social contexts and industrial contexts such as city development (Liu 2007), medical care services (Huang 2011), the wine industry (Brunori and Rossi 2000), rural livelihoods (Niehof and Price 2001), infrastructure planning (Lienert et al. 2013), real estate decision making (Lin 2010), and alliances between business and social enterprises (Sakarya et al. 2012) etc.

An open systems view can be quiet easily applied to an industry or a boom resulting from an increase in the level of industrial activity. Resources are taken in, undergo production processes, and result in products and services (Mingers 2002).[81] However, the ability of the system to function is constricted by the other system entities and surrounding conditions, which is outlined by "embeddedness" (pg. 6) articulated by Granovetter (1992). Economic institutions are constructed by individuals whose action is both facilitated and constrained by the structure and resources available in social networks in which they are embedded. As a result how an industry is organized is a social construction (Granovetter 1992). For example the oil industry needs employees who in turn need housing and other community services especially if the employees bring their families along. So the ability of the industry to hire and retain employees depends on the ability of the community to provide them housing and other amenities necessary. Embeddedness highlights the importance of relationships and networks of relationships in economic systems. Within these networks, institutions, individuals, and communities build relationships, which over time facilitate trust, cooperation, and collective action (Peredo and Chrisman 2006).

Using a systems approach to analyze and understand community development efforts provide a number of advantages (Cook 1994). Fischer and Keith (1977) state that by examining development (or in this case an oil boom) in a way that meshes the actors with their proponents and opponents, one can observe multi-party and multi-dimensional processes, which facilitates decision making. Perhaps the major strength of the system approach as an assessment and

[81] However, complex systems such as social and human systems are multidimensional (social, cultural, technical, economic, regulatory). In addition individuals, companies, and communities are linked through systems of communication, transportation, and commerce (Fiksel 2003).

analysis mechanism is in its holistic and comprehensive perspective, and capability to provide an indication of the extent to which the system as a whole could achieve the issues and goals at hand (Fischer and Keith 1977).

Systems theory enables the understanding of the functioning and structure of system entities in order to interpret problems and develop balanced intervention strategies (Friedman and Allen 2011). As a result some of the key concerns in community development, such as understanding the dynamics of inter-group relationships, and considering the changes involved in planning development activities, can be easily understood and described (Tamas 2000). A focus on development enables the actors or entities involved to go beyond the narrow or rigid relationships that previously existed to establish new relationships and new structures (Van Der Ploeg and Renting 2000). This capability is especially needed when communities are undergoing a fundamental transformation such as in the case of western North Dakota. Options and choices for community development can be easily perceived by reviewing the community as a system in its present state, and then looking at the implications of interactions and relationships between members on a desired future state (Brooks 1971).

Rural industrialization and associated growth create an elaborate and extremely complex matrix of interdependencies among governments, the private sector, and communities. Rural community development needs a sociology that maps these relationships and which provides explanations for changes in them over time (Summers 1986). Systems approach offers a perspective more useful in understanding the interrelationships and multiple functions, compared to other analytical approaches, because the systems view is a way of thinking in terms of connectedness, relationships, and context (Gallopin 2003; Wall 1999; Cavaye 2006). There is no doubt that the boom has generated jobs and economic opportunity. In addition to focusing on

jobs and income, community development efforts must facilitate other conditions that support individual and social well-being (Bridger and Alter 2009).[82] These approaches require solutions to challenges created by the boom. Approaching the oil boom as a system or a unified whole offers a valuable way to gain a deeper understanding of the function, structure, and relationships, which will assist the crafting of appropriate community development strategies.

4.4. Methodology

This chapter's purpose is to understand western North Dakota's oil boom as a socio-economic system that is useful in community development, planning, and policy formulation. The study's geographic area was defined as the 19 oil and gas producing counties in North Dakota as delineated by the ND Association of Oil and Gas Producing Counties. There are no prior similar studies to guide the methodology. Therefore, a qualitative methodological approach that provided flexibility and adaptability to discover and explore the factors undergirding the socio-economic system was required for the study.

In order to gain a fundamental and preliminary understanding of the setting, documentary/content analysis was undertaken as a preliminary effort. The *Williston Herald* is one of the most widely read local newspapers in the area. The paper is widely available in print and online editions. Online visitors can express their views, concerns and reactions to the articles in the comment sections. The opinion articles section, which comprises of columns, editorials, and letters to editor, presents useful data for analysis of public opinion. The 512 letters to the editor, published during the period 01/01/2010 to 12/31/2012 and 3877 online comments made

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[82] The data should include an understanding of system's operation, the advantages and constraints, the governing rule of things. However, it's impossible or superfluously costly to gain a complete and comprehensive understanding of all system dimensions especially on a complex system (Knickel and Renting 2000).

by anonymous visitors on opinion articles were manually coded and analyzed. This preliminary effort provided guidance to (1) design and development of questionnaires used in the study; (2) set the scope and boundaries of the study; and (3) identify key informants and prominent people in the community as potential participants.

The letters to the editor and the comments were open coded to (1) identify the entities of the socio-economic system, which is the first step in an SNA study; and (2) build a basic understanding of the relationships that exists between those entities. For example several letters to the editor highlighted (as the excerpt from one of the letters below show) several challenges faced by the community and different stakeholder groups involved:

> "Our community has many things to be grateful for. Among them is a stable economic base…. The infrastructure of our town is in disarray. Understandably, our city leaders are working on addressing and prioritizing. In the meantime, we are growing impatient. Be it roads, housing, retail or even the many minimum wage jobs that are swelling in number…yes we need to act."[83]

Another online comment to a letter to the editor summarized the basic boom cycle:

> "The bodies are needed. Housing is needed for bodies. Infrastructure is needed for bodies. There is an abundance of bodies looking for work EVERYWHERE in the country other than North Dakota. Growth, improvement and change are all necessary to get through this problem that North Dakota is having. The local authorities, elected officials, powers that be if you will, hold the answers. Action is needed. Change is necessary.

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[83] Flaten, S. 2011. Resolve to be Positive. Williston Herald. Posted online January 1, 2011.

Embracing the change and having good plans will alleviate the burden the area is experiencing."[84]

Coding of the letters and comments enabled the identification of four major stakeholder groups [85] and provided a basic preliminary understanding of the relationships that exist between different system entities.

This study's data was gathered through 89 in-depth, semi-structured, and open-ended, questionnaire based face-to-face interviews and first-hand observation of behavior and interactions. Participants include members from all four stakeholder groups: oil industry, public services, non-oil service industry, and community. When needed to ensure adequate information gathering, the original questionnaire was reshaped and fine-tuned as the interviews progressed. Each interview lasted between 1.0-1.5 hours, and was conducted between June and August 2013. Field notes were taken to understand the setting and context of the interviews. Participants were recruited using several methods: (1) key community informants identified during pre-study efforts; (2) university extension service in western North Dakota; (3) personal acquaintances of friends and family; (4) snowballing off of participants in the study or chain/referral sampling. The study population was left unspecified and interviews were continued until reaching a saturation point at which no new information was forthcoming. Probes were used whenever necessary. Interviews were recorded with participant consent. Participants were encouraged to express their ideas and thoughts freely with guaranteed anonymity. The interviews were transcribed and then analyzed using qualitative/ inductive coding and analysis methodologies.

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[84] This was an online comment made by an anonymous visitor to a letter by Smith, N. 2011. Real estate, Zoning Issues Cause Difficulty in the Bakken. Williston Herald. Posted online October 28, 2011.

[85] Please refer figure 8.

Knickel and Renting (2000) suggest that analysis of systems should involve two main steps. First, the disentanglement, visualization, and further specification of the elements, mechanisms, and micro–macro relations that together constitute the process under consideration. Second, a closer analysis of the key linkages and effects that make up the socio-economic impacts of the processes involved. Therefore, a two-tier coding approach was adopted. At the primary level data was coded (structural coding/open coding) to represent (or categorized under) different cycles or sub-systems within the boom such as the basic boom cycle, the housing cycle etc.

At the secondary level data was coded (thematic coding) to represent relationships and interconnections (a SNA effort) between different stakeholder groups within each cycle and the resulting effects. For example the below participant comment of a non-oil service business owner summarizes the housing cycle and shows the interconnections between various stakeholder groups:

> "An oil company comes into the community they see a house and they approach the owner and they say this is how much we'll give you and they may base their price on their need they're not paying the actual value. That's driven the prices of homes up. Lot of my guys and gals want to buy a house. They can't afford a $360,000 house on a $40,000 salary. So they go to rent. The apartments are renting from $2,000 to $3,000 for a two bedroom apartment. They can't afford that. So what do I do? By far housing is our biggest challenge."

The data under each cycle were assimilated to represent major themes and consistent patterns, which led to the development of the graphical representations of the cycles. The findings and

interpretations were checked with community members who were not participants of the interviews to ensure pertinence, accuracy, and validity.

4.5. Findings

Figure 8 below outlines the framework for the oil boom as a socio-economic system. The system uses technology, employees, community infrastructure, such as roads, housing, water and sewer, raw materials and industrial infrastructure,[86] and financial investments as inputs. In addition, the system also requires resources and services from the support systems, such as necessary permits from regulatory agencies, water and other materials through the natural resources system, and support and facilitation through local and state government.

Stakeholders embedded in the socio-economic system are clustered into four groups: oil industry and associated support services, community, public services sector, such as education, health, emergency services, law enforcement, social services, city cleaning and maintenance, and the non-oil service industry including all other supporting businesses not directly involved with the oil industry.[87] The community cluster is a fluid system entity as it includes several resident groups such as mineral rights owners, employees, longtime residents, senior citizens, and new comers into the community. Employees living in workforce housing such as “mancamps” and other temporary housing arrangements are not considered part of the community cluster as they are mostly transient, returning to their home communities during their days off or holidays.

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[86] The industrial infrastructure includes drilling rigs, pump jacks and other equipment and machinery which is beyond the discussion of this chapter.

[87] These four cluster are consistent with the parties-at-interest in community growth management identified by Gilmore (1976): (i) industry; (ii) state, local, and federal government; (iii) commercial interest; and (iv) the general public (including both the old-timers and the newcomers).

The outputs comprise of oil and gas production and attainment of community development goals. Study participants identified five different areas or long-term goals that must be enhanced or achieved through community development efforts: (1) enhancing community infrastructure including roads, housing, schools, and design and layout of community; (2) economic development such as creation of job opportunities and security; (3) population stability and growth; (4) social relationships, unity, and trust among community members; and (4) community amenities and services, such as parks and recreation, range of retail and dining choices, community centers, law enforcement and other public services.

Since the socio-economic system is broad and complex, the analysis is broken down to four different cycles or social networks. They are: basic boom cycle, social relationship cycle, housing cycle, and non-oil industry cycle. The stakeholders in each cycle are represented by solid-line rectangles. The conditions of historical context and other macro social factors such as media and national economy, and the needs of the oil industry contributing towards the boom are depicted by rounded rectangles. The stakeholder groups are connected by impacts, exchanges, and changes caused by the boom which are indicated by oval shapes. The arrows show the direction of relationships and linkages. The broken arrows indicate feedback.

The socio-economic system has two main triggers: pace of drilling permit approvals and rapid influx of people. Pace of issuing drilling permits acts as a trigger, as once the permits are secured, the oil industry activity is organized around a drilling rig which requires hundreds of employees, thousands of truck trips and other resource inputs. Rapid influx of people causes several impacts that are explicated through the cycles presented in this chapter.

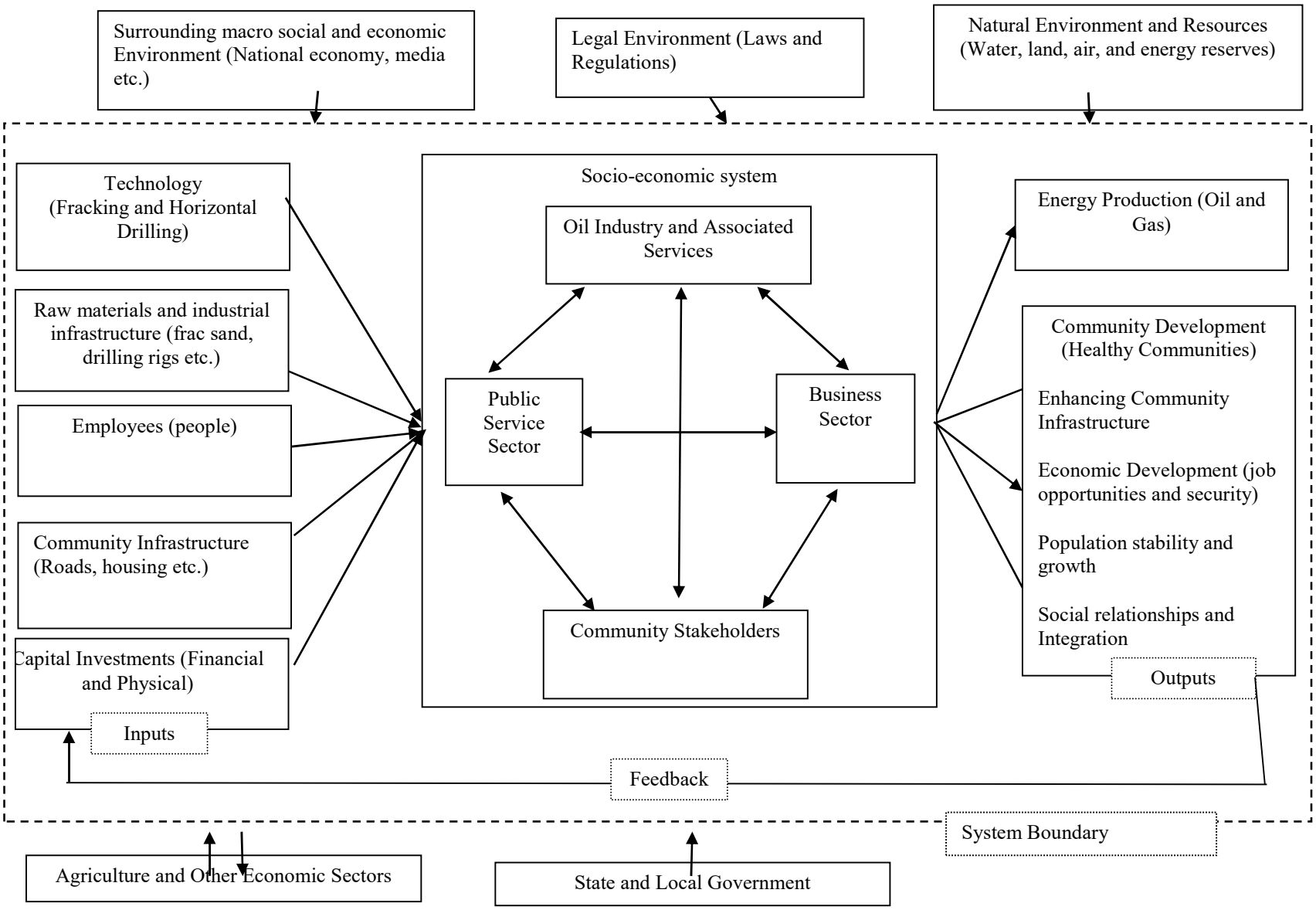

Figure 8. Oil Boom as a Socio-Economic System

4.5.1. Basic Boom Cycle[88]

The oil industry is a very cost dependent and cost conscious industry because of the considerable financial investment that goes into drilling and fracking an oil well. As a result, the industry aims to secure mineral leases at the lowest cost by completing the drilling process as quickly as possible. In order for the drilling process to begin, several permits and leases are required from stakeholders, such as mineral rights owners, and industrial commission. Securing these permits generate a demand for inputs including community infrastructure, employees, and other raw materials. The widespread drilling process results in increased drilling related activity and other supporting activities. Prior to the boom, there was a lack of investments to enhance community infrastructure, such as roads and housing, because of declining population and lack of financial resources. As a result of increased oil activity, the demand for community infrastructure has created a construction boom as a boom within a boom. Therefore, the increase in oil drilling activity and the induced secondary and supporting economic activity in other sectors such as housing, infrastructure construction, and related services are collectively referred to as the oil boom.

The boom activities have generated a variety of job opportunities. Out-migration- especially of young people- before the boom meant a lack of local labor availability. The boom began during a period of time where the American economy was going through the worst recession since the Great Depression: people were losing jobs all over the country. The boom has drawn a lot of national media attention and people from all over the country looking for work.

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[88] It must be noted that this cycle is termed the basic boom cycle - and not an oil industry cycle - because the nature and context of activities that take place during the drilling and development phase of oil production are different from the nature and context of activities that take place during the production phase of oil production.

The area's alteration was captured d by one participant as: "we had an economic meltdown in the country. Around 2008-9, when it started, there was work here. That's when the influx started. I mean we had a major influx of people in a real short period of time which basically turned everything upside down." The in-migrants are either new residents (i.e. people with families) into the community or people who grew up in western North Dakota, moved away for better opportunities, and have returned with the boom. In addition there are many transient workers, who are without their families and in the area just for work purposes only.

The increase in oil drilling and associated economic activity has generated a number of positive and negative impacts for various stakeholders. First, increased tax revenue and royalty income has benefitted the entire state and all the stakeholders who own mineral rights and other lease rights. The general community has indirectly benefited from increased capital being available in the community. On the negative side, are legitimate concerns about traffic and safety issues because of the increased oil traffic and industrial activity. The increased activity also has created a major strain on local roads and infrastructure, which in most cases were not designed for heavy oil traffic and use. One participant described these effects:

> "There's been a lot of positives. The grocery store we have now is probably four times or five times the building it used to be in. We've new businesses in town so there's a lot of job opportunities. It gives the opportunity for young people to move back. But I used to go to the restaurant I knew 90% of the people in the restaurant now if I go I don't even know 10% of the people. Yes there are challenges. The infrastructure challenges needs to be dealt. Housing is just one of the biggest obstacles. The impact of increased traffic is a big issue. There is good and bad you have to work with what you have try and maintain high standards for communities."

The influx of workers have altered the male-female ratio[89] and diversity[90] in the community, which has both positive and negative consequences. The increase in crime and higher proportion of males to females have created safety and security concerns within the community, especially for women.[91] This was described by one female participant:

> "I think people take more caution. You didn't use to lock your house or car not anymore. It's definitely outnumbered male to female and it definitely doesn't seem safe. Not because you don't trust people but because there's an element of the unknown here. That never used to be here."

The rapid influx of people has also generated an extremely strong demand for housing, public services, and private business services, which has overwhelmed existing infrastructure, but offer greater long term opportunity as outlined by one participant:

> "There's lot of things that we've benefitted. We have a choice of hotels we have restaurants we have gas stations we have shopping, some really good things that will benefit the community. There's a lot of good people that have come in. Our roads were better. Those things were better. The toll it takes on like our hospital our fire department, our fire and ambulance used to be all volunteers. Now they have a couple of paid paramedics and they can't keep up. They're building a hotel here that's three or four but the fire truck ladders only go two floors. We just weren't equipped."

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[89] Most workers attracted to the oil industry and associated service related jobs are males.
[90] Before the boom most communities in western North Dakota were homogenous communities with white/Caucasian ethnicities, mostly of German, Norwegian, eastern European, and Scandinavian descent. The boom as attracted many other ethnicities such as African American, Asian, and Hispanics to the area.
[91] These issues are further articulated in our research on quality of life

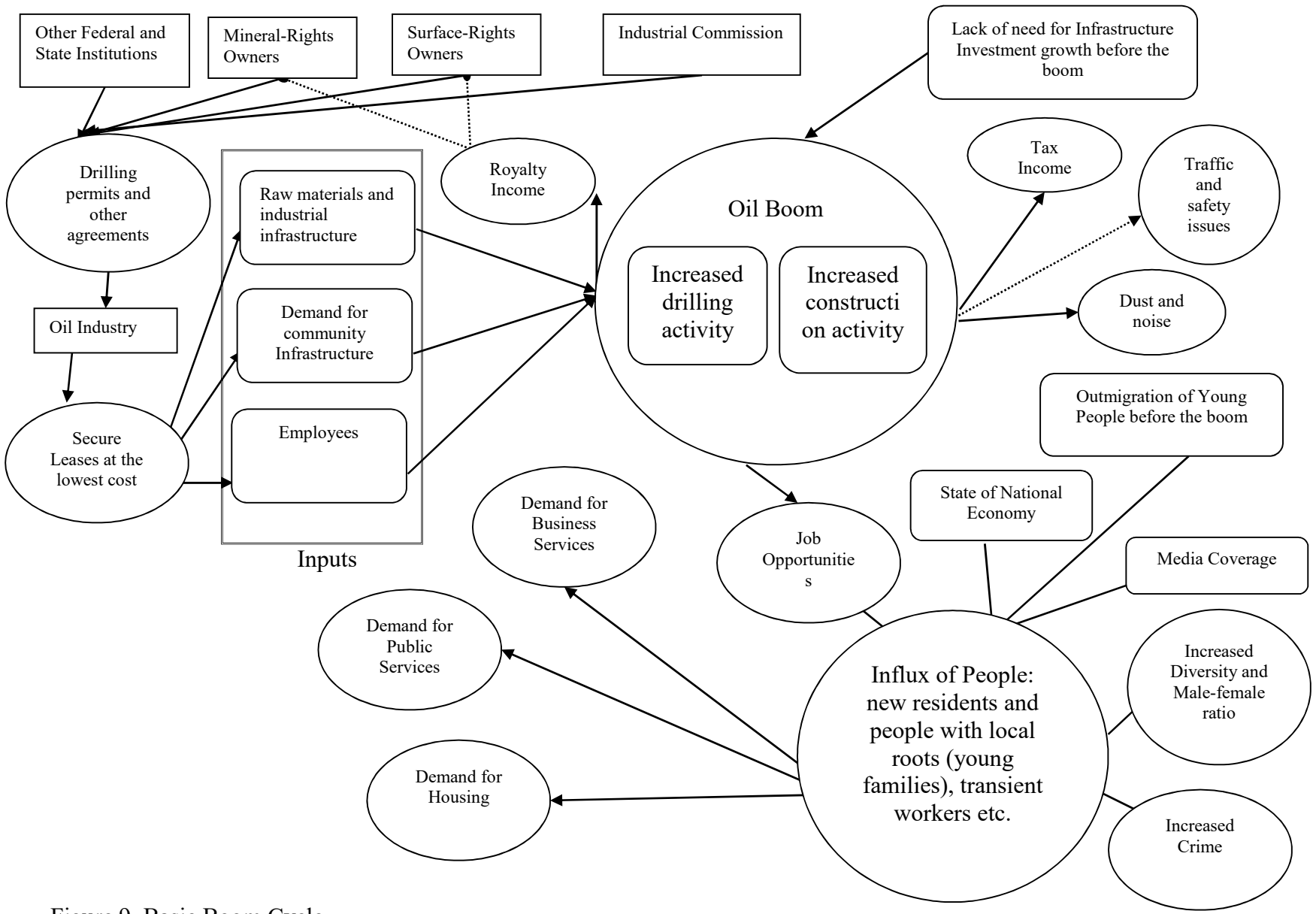

Figure 9. Basic Boom Cycle

4.5.2. Housing Cycle

Lack of affordable housing has become the biggest barrier or bottleneck for community development in western North Dakota as described by a public official: *"it's right now the number one thing holding us back. Without question."* A rapid influx of people has generated a strong demand for housing, which has resulted in temporary worker housing, escalation in property and rental prices, and a housing shortage as shown in figure 10. In fact, there are too many people who need housing and too little inventory on the market. Therefore, to find practical solutions to oil boom problems, it is important to understand the conditions and factors that contribute to inadequate affordable housing and its implications on community development. One participant described a contributory cause to the housing shortage:

> "The bad thing about that [last oil boom] nobody had been through an oil boom before, so the city went in and put in all these sewer and water, and infrastructure, and they put them on specials. Then the oil boom went bust. We were sat in millions and millions of dollars in debt in special assessments. So the people that lived here ended up paying all that. So three [or] four years ago when this happened, people were very, very skeptical. Remember the 80's? It was always that, remember the 80's."

The experience of the 80's bust has affected the community in two ways. First, communities in western North Dakota became aware of any boom's uncertainty and were skeptical about the present boom's longevity, resulting in a strong reluctance to invest in housing and other infrastructure at the beginning of the boom. Second, the drive to make as much money before the boom goes away has resulted in "greed" as outlined by many participants.

As noted in the basic boom cycle, the oil industry needs employees and housing for those employees. However, the entire demand for worker housing cannot be met through temporary

worker housing solutions. As a result the industry is willing to pay more for workforce housing through conventional housing choices, such as houses and apartments, which are available in the community. As a result rental prices of apartments and houses have doubled or tripled as stated by one participant:

> "You know they are talking about $2000 for a one bedroom, $2500 for two bedroom, and $3500 for three bedroom, and the only reason why they are getting that is because the oil companies are paying the rent for their employees. Otherwise they couldn't get employees."

The escalation in property prices presents an opportunity to sell for those residents who wanted to move out of the community, or soon developed that preference.[92] In addition many local landlords or business owners were nearing retirement age around 2008-9, and in most cases, these properties were purchased by outside investors at high prices caused by market conditions, as described by one participant:

> "Lot of the business owners were nearing that retirement age when this happened. The grocery store that happened. The drug store the hardware store sold. Locals have sold their homes and are purchased by oil companies or outsiders that have kind of purchased them. Their homes worth $50,000 onetime are now worth $250,000 and they could sell their home and go to where their children or grandchildren are. Some people have moved because they don't like the busyness of it."

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[92] Several reasons prompt residents to move away from the community. Some seniors no longer have family or children in the area and they want to move to areas where their children are. Some seniors require special amenities and services, such as better healthcare, and move to areas where they are easily accessible. Some residents simply do not like the changes in the community because of industrial activity and want to move.

The high purchase prices prompted the new landlords to increase rents to cover their investment and make a profit. In addition the uncertainty associated with the boom-bust cycle has prompted many real estate investors to target shorter expected payback periods of 3-8 years, compared to more conventional payback periods of 10-20 years in the real estate industry. This was described by a real estate agent:

> "Most of the developers and builders that come out here their goal is to build and be paid off in 5 years. They're afraid of oil. Oil has a history of being up and down so their goal is to build it and charge a price that will pay up their investment in 5 years."

The reduced time period means that a new owner must produce a much higher return on investment than in markets in which time constraints are not as pressing. As a result many factors such as higher willingness to pay, demand-supply dynamics, and a shorter expected payback period has escalated rents, resulting in lack of affordability of housing.

Additionally, prices of most newly constructed single family homes are over $250,000 and are not easily affordable to many people working in non-oil jobs. Therefore, owning a home in present housing market conditions is a considerable challenge for many new residents, especially if they are not working in the oil industry. One of the public officials described the situation:

> "I believe if we could get a developer to put down a spec home that's around $175,000 that person would be nothing but an order taker. The problem here is the person who was here first and said I'm gonna bring you affordable housing and built a $350,000 house was wrong and its time we go back and redefine what is affordable. But the problem is that the industry is in such need of any type of housing they don't care what it costs."

As a result, many young families or residents have had to move in with their parents or share housing with several others to make it affordable as explained by a young resident who moved back:

> "We were talking about it for quite a while but we didn't know where we were going to live because the cost of housing. My husband owned a home he bought it for $40,000 and it sold for like $120,000 just a few years later. Luckily a house opened up in our family and somebody passed away unfortunately. We were fortunate enough to live in that house."

If they are working in the oil industry these young families are eventually able to move out in to a home of their own.

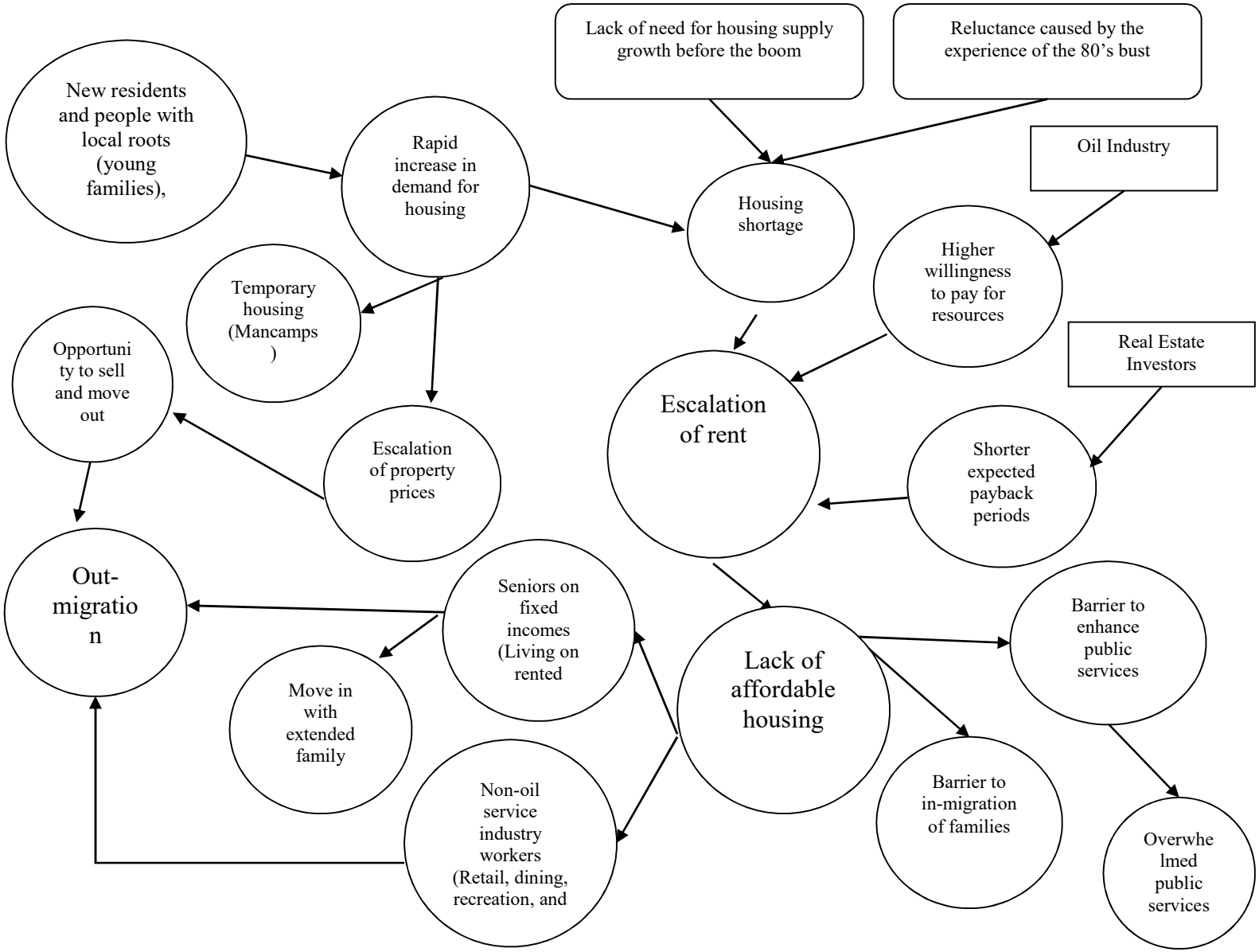

Figure 10. Housing Cycle

Several factors such as demand and supply mechanisms instigating a rapid increase in real-estate (land) prices, high cost of construction materials, and higher worker costs[93] contribute towards the high prices of new single family homes. In addition the weather conditions in North Dakota only permits a shorter construction period, which festers the ability of the housing supply growth to catch up to the growth in demand for housing. Lack of affordable housing kindles a vicious cycle that affects several stakeholder groups and overall community in several ways as outlined by a participant:

> "It begins and ends with housing that is the number one issue. With seniors who had their rents raised with younger people who can't afford to buy so even if they did want to move their families here they can't make it work financially. Then that again affects which retail stores move here because if they don't see houses they don't see families they don't see workers they're not going to do it. They can't afford to pay oilfield wages too. So major challenge is housing."

First, it is one of the major factors affecting senior citizens, retired or disabled residents, and non-oil industry workers living in rented housing. Most residents living on fixed incomes cannot afford the two to three fold increases in rents.[94] There is also a considerable wage disparity between the oil industry and non-oil industry services.[95] The non-oil industry workers,

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[93] Cost of workers are higher in western North Dakota compared to other areas for several reasons. The shortage of workers in the area prompts builders to bring in worker crews from their home communities. These wrokers have to be provided with housing, lodging, and transportation back and forth. In addition the competition from the oil industry for workers with similar skills has led to escalation in wages.

[94] Some seniors have benefitted from mineral rights and other lease rights. But the seniors who do not own minerals or leases are mostly on fixed incomes.

[95] As an example of the wage disparity, according to North Dakota Job Service data, the 2013 average weekly wage in the oil and gas industry in Williams County was $1,946. The average

such as retail, dining, and public services, such as education, health, and law enforcement cannot afford $2000 a month rent. Even if they can pay their rent, the strain on their budgets makes it difficult for them to buy other commodities they might need or desire.

Second, the lack of affordable housing is one of the major factors forcing out-migration. When faced with unaffordable rent, residents, such as seniors and young families with local roots,[96] face four options: move in with parents or other family; share housing with many other tenants; move into a temporary home such as a trailer; or move out of the community. Such living situations negatively affect the quality of life of these community members as stated by one participant:

> "Because of this boom both of [my neighbor's] daughters had to move in back with her. So now all the family is living in this one small house. We do have lots children moving back with their parents. Because they find nowhere to live. So those people who used to live independently now have an extended family situation."

If seniors or other non-oil service industry workers cannot find suitable and affordable housing, they are forced to move out of the community, as one longtime resident highlighted:

> "The seniors who don't have a house, they move. The rent goes right off the chart. There was an apartment complex down the road that was for seniors, and a business in town bought it for their employees and the seniors had to move."

Third, the lack of affordable housing affects existing service industry businesses in several ways. Service industry workers move away when they cannot afford housing, which

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weekly wage in the same County for educational services, health services, and public administration were $713, $895, and $873 respectively.

[96] Even those who moved back into the community.

creates a worker shortage. One service industry worker stated: “so everything else other than the oil industry is short staffed. Like I said even with my wages I would probably be struggling if I didn’t live with my kids.” As a result the service industry is obliged to increase wages and benefits to retain and attract workers. The increase in wages causes an inflationary increase in prices that raises the cost of living.

Fourth, similar to the service industry, escalation of rent hinders public services’ expansion because employees cannot find affordable housing. With too few public service workers and a vastly larger demand than before the boom, the public services that are available are overwhelmed. A city employee provided evidence of this situation when stating:

> “We just made an offer to an assistant city engineer for over $80,000 a year and he turned us down. He’s from South Dakota wanted to come back to the area. He was excited, and then he started to look at housing, and he said ‘I can live in San Francisco cheaper than I can live in here,’ and so $80,000 just wasn’t an acceptable offer. It affects every single department we operate as a city.”

As a result, many non-oil service industry businesses and public services have had to offer housing to their employees at a subsidized rate. The inability to enhance public services to meet the needs of a growing population, such as law enforcement and education, affects the feeling or safety and security within the community and results in crowded schools respectively, which pose considerable challenges to community development.

Fifth, being unable to afford suitable housing affects oil industry employees and other workers who want to bring their families to the area. The study participants clearly indicated that job opportunity, presence of family, and social support group dominate decisions on place of living. Counterbalancing these decision factors was the great recession that drove families to

prioritize economic opportunity over family geographic unity. As a result many males moved to western North Dakota in search of a job and without their families, if they had them.

There are a number of decision factors against a worker moving his family to western North Dakota. First, as the national economy recovers and opportunities open up in their home communities many workers might be tempted to go back to their home communities, if housing costs remain too high for them. One longtime resident described the potential impact on community:

> "Well people aren't finding a place to live. There'll be people that want to come here and work, and they have mortgages that they can't pay in Montana or wherever, so they are sending all their money back to pay their mortgage because they can't sell their house and they can't afford $1500 a month rent for one bedroom apartment. It's hurting us because we're not getting the long-term residents because there is no place for them to live."

Participants also cited several reasons why people might be reluctant to bring their families to western North Dakota. The cold and long winter weather conditions in North Dakota discourage people who are accustomed to a warmer climate conditions. In addition, some family members do not want to move because of family conditions, such as children being established in high school. Many people also do not want to leave communities where they have established strong attachments and social support networks comprising of families and friends. Finally, communities in western North Dakota do not provide the diversity of services and amenities to people who are used to an urban lifestyle. As a result the workforce might become highly transient. Therefore, considering all these reasons, lack of affordable housing has become the biggest challenge or barrier for community development.

4.5.3. Social Relations Cycle

Figure 11 depicts the social relations cycle. Before the boom, social relationship networks were characterized by endogamous relationships where everyone in the community knew each other (density of acquaintance).[97] This type of social relationships or "Gemeinschaft"[98] social structure is typical of any small rural community. The high density of acquaintance generated trust and unity, which builds community solidarity. The rapid influx of people and out-migration of longtime residents has disrupted these social networks,[99] because people no longer know their neighbors or most other members in the community in order to trust them as explained by one longtime resident: "You could leave your door open. You knew your neighbors. Today you don't know anybody don't trust anybody." The disruption of established social networks and other factors, such as increased crime, has prompted longtime residents to become skeptical and guarded, which acts as a barrier for new comers to integrate and establish new social networks resulting in "us versus them" type of mentality. This *otherness* perspective has fragmented the community. One longtime resident described it as: "There is a guardedness to this community. Maybe it's the nature of humanity. I don't know any community that would say 'Welcome strangers. Come in and change our lives.' But we don't know them."

One weak offset that would increase community bonds are when people with local ties move back to the communities where they grew up. Since they are familiar with the social conventions and residents, it provides them an opportunity to reestablish old relationships and

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[97] For a detailed discussion see Freudenburg. 1986. The Density of Acquaintanceship: An Overlooked Variable in Community Research? *American Journal of Sociology*. 92(1), 27-63.
[98] For a detailed discussion see *Gold, R.L.1985. Ranching*, *Mining, and the Human Impact of Natural Resource Development.* New Brunswick, NJ: Transaction Books.
[99] This phenomenon has been well documented in literature as the social disruption hypothesis. Please see Jacquet and Stedman (2014) or Luthra (2006) for a detailed discussion.

networks. Mitigating this positive are the long and extended working hours irrespective of the type of job or industry, and other factors, such as increased traffic, which contributes to stress as described by one participant:

> "I think part of the breakdown of the social structure [is stress]. You know everybody used to be close, and now everybody is so busy and you don't have the time to socialize anymore or as much as you used to, and there's so much stress in the community itself that when you're under stress you're not as friendly or as outgoing as you were, and I'm kind of seeing some of that myself."

There are a number of other factors affecting social cohesion. The oil boom has financially benefitted certain stakeholder groups such as mineral rights owners, business owners, and landlords while it has negatively affected other stakeholder groups such as senior citizens and those whose budgets are stretched. As a result the inequality in distribution of costs and benefits is affecting the established social networks as outlined by one participant: "now the oil comes along and now you have mineral rights and now you have land owners. Those two types don't get along. Its magnified lot of the separation and lot of the conflicts it's just intensified." In addition the transient workforce and workers living in temporary housing do not have many opportunities to integrate and establish relationships with the other community members. Hence, the problem of *otherness* is likely to persist until new and long term residents are able to sufficiently commingle.

The factors affecting social relationship networks create several challenges for community development. Many new and longtime residents may experience a lack of social support groups in the form of friends, family, and other community connections. The lack of unity and trust in the community may portray the communities as unwelcoming to new residents

or people who are interested in moving into the area. Therefore, community planners and developers must focus on crafting better community integration strategies aimed at enhancing the unity, interaction, cooperation, and trust within the community.

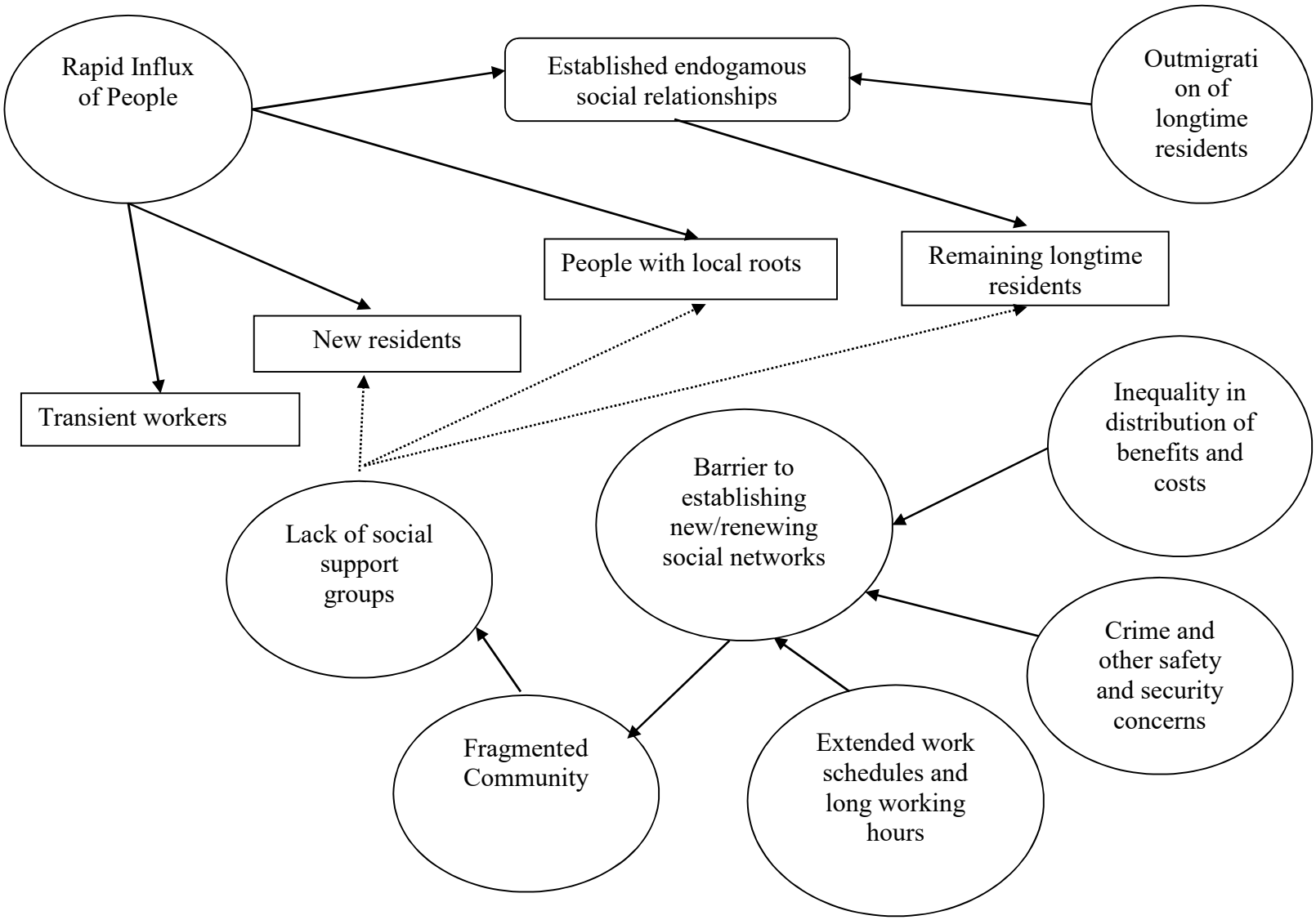

Figure 11. Social Relations Cycle

4.5.4. Non-Oil Industry Cycle

As shown in figure 12, the non-oil industry includes the private service industry, such as retail, dining, childcare, entertainment, and other services, and the public service industry including city/county government, some healthcare, social services, education, and law enforcement. There is a significant wage disparity between oil and non-oil industry employees. As a result, if presented with an opportunity for oil industry employment, many non-oil industry workers will do so. To offset the attraction of higher wages elsewhere, private and public service industries have had to increase wages resulting in increased costs that contribute to local inflation, which in turn, affects the whole community. One local business owner stated that: "if you are not a business person, you don't understand what the cost of labor is. I mean our cost of labor has drastically increased over what was pre-Bakken, just because of the wages we need to pay."

As discussed under the housing cycle, lack of affordable housing has caused a shortage of service industry workers, and other factors, such as lack of daycare, has aggravated the situation. One stay-at-home mother described that:

> "Daycare is another huge, huge issue. I can name 15 women right now that are not working because they can't afford daycare. You can't find it. If you can find it, it's so expensive. I like to work I would have loved to go back to work."

In addition, factors such as work stress and safety concerns have changed the typical employee composition in the service industry. High school/college students, working mothers, and retired seniors are no longer a major part of the workforce in these industries for a variety of reasons, including lacking infrastructure that would allow them to work and take care of their other needs.

The shortage of workers in the public and private service sectors has caused many services to become inaccessible, which affects the whole community. The shortage also has resulted in waiting lines and longer service times. As a result any new business planning to move to the area is faced with five major challenges. First, it might be difficult to find adequate operational and management employees locally, in which case it might have to figure out ways to bring in employees from elsewhere. Second, securing housing for its employees through building, buying, or renting housing. Third, the high rent, high employment costs, and other expenditures imply high operational costs to recoup. Forth, if the business decides to build its own facility, the high real-estate prices and construction cost will require a large financial investment or commitment. Fifth, it might have to compete with already established businesses that already enjoy scale benefits and transportation advantages. These factors pose challenges for attracting new businesses into the area. That being said, many new businesses such as restaurants, big box stores, and hotels have moved into the area and the county governments have made several attempts to improve community infrastructure by enhancing community centers, city parks, and other amenities.

In summary, the basic boom cycle, the housing cycle, social relations cycle, and non-oil service industry cycle highlight five challenges or drivers that need to be addressed through community development efforts: development of affordable housing, investment in community infrastructure, expanding public services, attracting new businesses to the area, and better community integration strategies to build trust and unity within the community. The systems approach of this study provides a rationale and explanation of how these challenges manifest and implications of these challenges on the community, so that policy makers, community planners,

and other stakeholders could work towards crafting community development strategies that address these challenges.

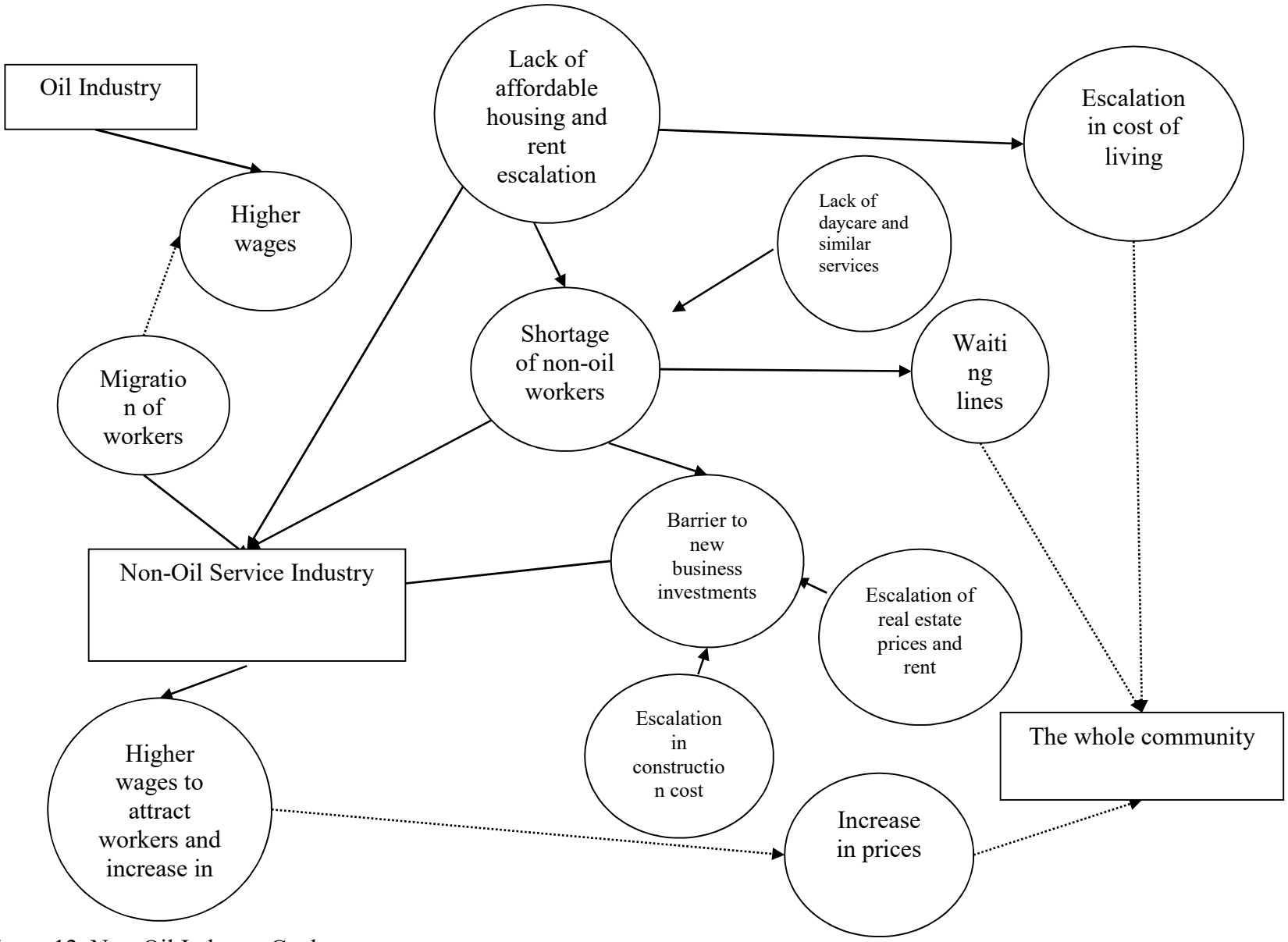

Figure 12. Non-Oil Industry Cycle

4.6. Discussion

The scope of this study is limited to a socio-economic system at the community stakeholder level. However, the four cycles that make up the socio-economic system present several implications useful for community developers, planners, and policy makers. The in/out migration dynamics represent a fundamental shift in population dynamics and composition. Generally, residents move away from the community because: (1) the increase in real estate prices is an opportunity to sell and move out for those who want to move away from the community; (2) they don't like the changes created by the boom on the community and way of life; (3) they cannot afford the cost of living. In addition, specifically senior citizens move away from the community because: (1) they want to be with family located elsewhere; (2) there is a lack or difficulty of access to services such as healthcare; (3) they are compelled to leave because they cannot afford housing. The boom has attracted many young families, while seniors - mainly in rented housing - have been forced to migrate out; thereby reducing the community's average age. It is important to retain these young families so that communities in western North Dakota do not experience a serious out-migration that handicaps the community once the oil industry moves from drilling to production stage. As a result community development must focus on catering to the needs of a younger population (schools, retail, recreation, entertainment opportunities etc.). Ability to attract new businesses in retail, dining, and recreation will better address the needs of a younger population.

Several factors or changes caused by the boom, such as more traffic, increased crime, dust, noise, rapid local inflation, negatively affect residents' quality of life. Addressing many of these issues require investment in public services, such as law enforcement, and community infrastructure, such as roads. The success of resource development is predicated on the

availability of a variety of services and facilities often provided by governments as they seek to encourage such development. Fischer and Keith (1977) list several petroleum infrastructures support inputs such as: government geological surveys, highway and road systems, community development, communication services, and incentive programs. While the importance of a well-established infrastructure for a petroleum program will vary depending on the location and the nature of the program itself, the infrastructure is a very important element (Fischer and Keith 1977). Therefore, the socio-economic system clearly indicates that the state and county governments must play an active role in facilitating community development by investing in public services and community infrastructure.

The boom has prompted growth in demand for virtually every service in the community, creating an opportunity to spur community development by attracting new businesses, other services, and population. The housing cycle shows that inflated rents inhibit several growth and development opportunities that spread across several sectors of the community. Factors discussed under the housing cycle also indicate that several factors will restrict reductions in rent through market mechanisms. Exacerbating the situation is North Dakota Century Code, Chapter 47-16-02.1, which expressively prohibits rent control. Rent control also might discourage investors and hinder growth. However, communities or oil industry cannot continue without the support of the service industry or public services, and the private and public service sectors must have employees and places for them to live. Therefore, further research is necessary to find appropriate mechanisms for development of affordable housing, especially for service sector and public service employees.

The social relations cycle indicates that the previously existing community has become somewhat fragmented and new residents might find it difficult to integrate and establish ties and

attachments to the community. Attachment to community will contribute towards retaining the new and longtime residents, as well as easing some of the subsidiary problems caused by a lack of social cohesion. As a result community development strategies are needed to enhance integration, corporation, trust, and unity within the community. Some community groups in the area such as Williston Friendly Faces, Oil Field Wives, Community Builders, and several local churches are trying to facilitate opportunities and avenues for new and longtime residents get to know each other better and establish social networks and relationships. Community development strategies must foster and support these efforts through better community integration programs.

There are several limitations of this study. The socio economic system is based on the assumption that oil industry is the primary economic machine driving growth in western North Dakota and that drilling will continue for several more years based on the models developed by research such as Ondracek Witwer and Bersch (2010) and other industrial forecasts. Other connected system factors, such as status of the national economy, enactment of new laws that affect horizontal drilling and fracturing processes, nature and cost effectiveness of extraction of other shale formations, will affect the sustainability and duration of the present oil boom. An oil boom is a massive socio-economic phenomenon. Therefore, a complete and comprehensive discussion of all its aspects cannot be achieved in one single study. As a result the scope of this chapter is limited to a socio-economic system at the stakeholder level. The aim of this study is to set a baseline or fundamental understanding of the boom as a system so that further studies can delve into components and entities within the system and related systems.

The environment is viewed as an interrelated system of its own. Therefore, the socio-economic system excludes any environmental issues or concerns, including water use, impacts on land, pollution, and waste disposal. The technological processes and activities involved in

horizontal drilling, oil fracking, and the implications of such on the environmental system is beyond the scope of this study. Future studies can focus on these issues. During data collection, participants expressed concerns such as dust, noise, and rural traffic that could affect agriculture and other economic sectors. Therefore, it is important to examine the impact of the oil boom on other economic sectors such as agriculture, tourism, and manufacturing.

4.7. Conclusion

This chapter presents one of the most comprehensive qualitative analysis of socio-economic conditions of boom communities during the drilling and oil development stage of the oil industry. The socio-economic system presented in this chapter is a novel effort to integrate SNA, boom impacts/changes, within a systems framework at the community stakeholder level. The findings of this study demonstrates that longitudinal changes or social disruptions of a boom manifest through the interactions and interrelationships between social entities or stakeholders acting within the boom condition and the surrounding conditions. Findings of this study yield similar results to other research focusing on social disruption hypothesis and boomtowns during growth stage. However, Smith et al. (2001) found that although social disruptions occur in several dimensions of social well-being during boom/growth periods, their effects are not permanent. Instead, wherever a boom-phase disruption was evident, the disruption was followed by a sharp rebound. Therefore, it is important to focus and craft community development strategies aimed at addressing the five main challenges or factors highlighted by the socio-economic system: development of affordable housing, investment in community infrastructure, expanding public services, attracting new businesses to the area, and better community integration strategies to build trust and unity within the community.

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5. A TALE OF TWO RURAL CITIES: INTERACTION OF COMMUNITY CAPITALS DURING A NORTH DAKOTA OIL BOOM

5.1 Abstract

The Community Capitals Framework was used in this study to understand, compare, and contrast how an oil boom is changing the nature, character, and context of two rural cities: "Minor" and "Major." Minor and Major are the county seats of two adjacent counties located in the heart of the North Dakota Bakken shale play. This study examines the changes and impacts caused by the oil boom through the lens of community capitals. The study investigates the interactions among the capitals and the challenges that need to be addressed to realize the community development potential created by shale oil development. Findings of this study show that the specific interactions among the capitals are multi-dimensional and the overall process represents a dual-effect. The findings highlight that understanding and guiding how the social and cultural capitals are changing and how those changes would shape political capital are the biggest challenges facing both communities.

5.2. Introduction

The 2005-2007 resurgence in oil drilling activity and the induced secondary and supporting economic activity in other sectors such as housing, infrastructure construction, and related services instigated a full scale oil boom, which changed the nature and context of rural communities in western North Dakota (Bangsund & Leistritz, 2011). This study focuses on two rural communities in North Dakota: "Major" and "Minor" (used for generic comparison purposes). Major and Minor[100] are the county seats of two adjacent counties located in the heart

[100] Major is Williston, located in Williams County and Minor is Stanley, located in Mountrail County, North Dakota

of the Bakken shale play. Before the oil boom began around 2005, Major and Minor had populations of around 1,300 and 12,500, respectively. From 2005 to 2013 the population in Major and Minor increased by 72% and 70% respectively. This rapid population influx symbolizes the process of social and economic transformation in these two communities, instigated by shale oil development. Based on the process of industrialization- created by increased oil drilling activity- and rapid population influx, it is clear that neither Major nor Minor can revert back to the social and economic conditions that existed before the boom. Hence, the communities are in a status of transition or a process of development to a new social and economic equilibrium.

Both Major and Minor are on a path that envisions the boom as an opportunity for community development. The basic mechanism underlying the boomtown model is the rapid growth of population that occurs as individuals migrate into an area to take advantage of employment opportunities (Gramling & Brabant, 1986). Research on social impact assessment and boomtowns highlight several positive economic benefits of rapid shale oil and gas development: increased jobs, higher paying jobs, overall economic prosperity, tax revenues, more services, new economic opportunities for local businesses and landowners (mineral and lease rights owners), and influx of young people (Murdock & Leistritz, 1979; Anderson & Theodori, 2009; Brasier et al. 2011). However, this literature also highlights several challenges or impacts such as increased strain on local infrastructure, including roads and housing; overwhelmed public services including health, education, and emergency services; traffic issues accidents and other safety concerns; increase in cost of living; and lack of affordable housing and concomitant outmigration of longtime residents (mostly seniors or others on fixed incomes)

living in rental housing (Anderson & Theodori, 2009; Jacquet, 2011; Williamson & Kolb, 2012; Schafft et al.2014; Brasier et al., 2011).

In addition, the social disruption hypothesis literature highlights several social impacts and pathologies of oil and gas development centered around noise that disturbs the peace and quiet nature of the surrounding environment (Ladd, 2013); increased levels of antisocial behavior, disorder, and crime (Ruddel & Ortiz, 2014); impacts to the rural landscape or biophysical environment (Alter, Brasier, McLaughlin, & Willits, 2010); impacts on social networks and relationships (Murdock & Leistritz, 1979); and lack of newcomer integration into the community (Ford, 1976). Freudenburg (1986) concludes that additional social impacts can occur if new employment opportunities attract enough job seekers to lower the community's density of acquaintanceship- the proportion of residents who know one another- thereby lessening the effectiveness of socialization and deviance control. A synopsis of the literature indicates that communities experiencing rapid energy development endure negative impacts in addition to positive impacts. Media reports from the Bakken shale area highlight several negative impacts or challenges that are noted in literature, which still remain to be addressed to realize the community development potential created by shale oil development. Achievement of the community development potential created by oil development requires a detailed understanding of the opportunities presented by oil development, the challenges and barriers that inhibit community development, and outline the solutions necessary to address challenges.

Flora and Flora (2013) present the Community Capitals Framework (CCF) as a systems approach to community development. CCF has been proposed as a method for understanding the nature of and process (es) underlying community development (Pigg et al. 2013). Communities actively looking to the future can use community capitals to measure current resources and

identify the potential for improvements (Jacobs, 2007). A review of literature suggests several features of CCF. First, CCF is an approach to analyze how communities function through asset mobilization to achieve community development goals (Flora & Arnold, 2012; Flora & Flora, 2013). Second, CCF focuses on the interaction among the seven community capitals and how they build upon one another, which represents the interactions among different parts of a community (Emery & Flora, 2006; Jacobs, 2007). Third, CCF, provides a systematic or structural way to look at community change or a way of analyzing inputs and impacts from both within and without the community that determine the success of community development efforts (Emery & Flora, 2006; Gutierrez-Montes, Emery, & Fernandez-Baca, 2009).

However, very few studies have examined the interactions, interdependencies, and relationships among the capitals in the CCF (exceptions are Guiterrez-Montez, 2005; Emery & Flora, 2006; Stofferahn, 2012; & Pigg et al., 2013). Guiterrez-Montez (2005) and Emery and Flora (2006) present the notion of spiraling-up as a way to perceive the relationship and interactions among capitals. Spiraling-up broadly represents that idea that investment in one capital could lead to increases in other capitals. Other studies such as Stofferahn (2012) support this notion. However, Pigg et al. (2013) contends that the relationships among the capitals are more complex than the spiraling-up notion would imply. Their findings suggest that the capitals are more multiple in their dimensionality and more limited in their relationships, which presents opportunities for different kinds of interventions to affect development. As a result, Pigg et al. (2013) claim that further research is likely necessary to more fully understand the relationships among the capitals and how they are deployed by community residents. Therefore, how the community capitals interact and affect each other in different contexts requires a further exploration.

The purpose of this chapter is twofold. The first purpose is to build an understanding of how the capitals interact and affect each other during a period of rapid shale oil development. It aims to examine the notion of spiraling-up in order to build an understanding of how interactions and relationships among capitals could be better utilized to construct community development strategies during a period of rapid socio-economic change. The second purpose is to use the CCF to understand the changes and potential community development strategies during a period of rapid shale oil development. The CCF has not been used to examine community changes and challenges during a period of rapid oil development. As a result, this study presents a novel way to look at community changes and impacts during a period of rapid oil development through its focus on two communities that are in close geographic proximity, but vary in size and nature. However, hydraulic fracturing (hereafter "fracking") and related technologies have spurred a broad debate, on the impacts of technology on the environment (or natural capital, which includes land, air, water, etc.), which is focused on issues such as potential water and air pollution. Substantiating these impacts will require a type of methodology different to the one adopted in this study. Therefore, the impact of rapid shale oil development on natural capital is considered beyond the scope of this chapter.

5.3. Review of Literature

Research on community capitals encompasses a broad variety of studies that focus on specific type of capital or multiple capitals. The focus of this research is on the interactions among the capitals of the CCF. As a result, the aim of the literature review is to: (1) summarize the CCF and briefly describe each type of capital and (2) analyze the literature that have focused on interaction between the capitals.

5.3.1. Community Capitals Framework (CCF)

Flora and Flora (2013) analysis of entrepreneurial communities revealed that communities that were successful in supporting healthy sustainable community and economic development (CED) paid attention to seven types of capital[101]: natural, cultural, human, social, political, financial and built, which is collectively referred to as the CCF. Table one summarizes the seven types of capitals. CCF offers a way to analyze community and economic development efforts from a systems perspective by identifying the assets in each capital (stock), the types of capital invested (flow), the interaction among the capitals, and the resulting impacts across capitals (Emery & Flora, 2006). Stocks and flows of the seven capitals are ends in themselves and a means to achieve desired future conditions (Flora & Flora, 2013). As policy makers and community developers alike require better ways to understand impacts and outcomes, the CCF provides an effective way to map the investment of capital stocks, strategies that influence the flow of assets across capitals, and results indicated by the increase of capital stocks (Emery & Flora, 2006).

[101] Communities have resources that can be reduced or dissipated, saved for future use, or invested to create new resources (Flora and Flora 2013). As a result, the most fundamental definition of capital is a resource or asset that can be used, invested, or exchanged to create new resources. These assets can be wisely invested, combined, and exchanged to create more community resources. But they can also be inactive be squandered or be hoarded if the community does not use them wisely (Emery, Fay, and FLora 2006; Flora and Arnold 2012).

Table 4. Brief Descriptions of the Seven Capitals

Capital	Description
Natural Capital	Refers to those assets that abide in a location and surrounds a place such as air, water, soil, land, and weather. In addition natural capital also includes amenities such as parks, farm land, and features of the landscape or of nature.
Cultural Capital	Reflects the way people see the world and determine how to act within it. It includes what one takes for granted, the values, and dynamics of what a person feels and comfortable with.
Human Capital	Includes the skills and abilities of people, determined by the intersection of nature (genetics) and nurture (social interactions and the environment), such as education, health, and self-esteem.
Social Capital	Reflects the connections between people and organizations or the social glue that make things happen, which includes mutual trust, reciprocity, collective identity, and a sense of shared future. *Bonding social capital* refers to those close ties that build community solidarity while *bridging social capital* involves ties that create and maintain bridges among different organizations and communities.
Political Capital	Represents the ability of a community or a group to turn its norms and values in to standards, which are then translated into rules and regulations that determine the distribution of resources. It also reflects access to power, such as access to local officials.
Financial Capital	Refers to the financial resources available to invest in community capacity building, to underwrite businesses development, to support civic and social entrepreneurship, and to accumulate wealth for future community development.
Built Capital	Is the human-constructed infrastructure such as telecommunications, industrial parks, main streets, water and sewer systems, roads, etc.

Source: Flora and Flora 2013; Emery, Fay, and Flora 2006

Use of CCF provides several advantages that can assist design of community development strategies during a period of rapid shale oil development. First, CCF can offer a mechanism for systemic evaluation, an evaluation process that looks at impacts to the community or system as a whole. Applying the framework allows for mapping outcomes by capitals and identifying indicators that can measure the degree of system change. Second, the use of the CCF offers a new viewpoint from which to analyze holistic community changes. The framework encourages policy/decision makers to think systemically about strategies and

projects, thus offering insights into additional indicators of success as well as potential areas of support. Third, mapping strategies and outcomes using the CCF provides concrete evidence of asset development as well as illuminating the interaction among the capitals that can generate an upward spiral of positive community change (Emery, Fay, & Flora 2006).

5.3.2. The Process of Spiraling-Up and Spiraling-Down

CCF highlights interdependence, interaction, and synergy among the capitals, as use of the assets in one capital can have a positive or negative effect over the quantity and the possibilities of other capitals (Gutierrez-Montes et al. 2009). Stock, in terms of the quantity and quality of assets within the community capitals and flow in terms of interactions and investments among capitals, are both important for understanding the community capacity within the context of the spiraling up/down processes (Emery & Flora, 2006). "Spiraling-up" represents a process by which assets invested in one capital increase the likelihood that assets will be increased in other community capitals in a cumulative causation process of success leading to success. Comparatively, loss or degradation of assets within one capital can instigate a cycle of reduction in all the community capitals, which is referred to as "spiral-down" (Gutierrez 2005; Emery & Flora, 2006; Fey, Bregendahl, & Flora, 2006; Gutierrez-Montes et al. 2009; Stofferahn, 2012). As one capital is increased, it is easier for increases, instead of declines, in the other community capitals to occur. Spiraling-up reverses declines in assets through a process in which asset growth becomes a self-reinforcing cycle of increasing opportunity and community wellbeing (Emery & Flora, 2006). The turning point for sustainable change is then reflected in both the investments of multiple capitals and their interactive and synergistic impact on the different capitals (Gutiérrez-Montes, 2005).

Spiraling-up and spiraling-down have been used to study and understand community dynamics and the process of recovery/transformation in various contexts such as impact of ecological disturbances or forest fires (Gutiérrez-Montes, 2005)[102], a community nearly destroyed by a tornado (Stofferahn, 2012)[103], and hometown competiveness programs (Emery & Flora, 2006).[104] However, Pigg et al. (2013) demonstrated that mostly all community development activities investigated exhibited the deployment of multiple capitals that appear to interact with each other in mutually beneficial ways, but do not represent the "spiraling up" analogy. Pigg et al. (2013) used the term "leveraging" to describe the way in which the deployment of one capital appears to influence the deployment of another form of capital. The analysis points to a more discriminating analogy that appears to relate more to how community residents perceive the world to work when they take into account the actual nature of the task at hand, the situation in their community, and the resources necessary to getting things done. As a result, Pigg et al. (2013) concluded that it would appear that there are underlying linkages within

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[102] During spiraling-down the a destroyed the environment, which led to decreased employment, which led to poverty and health problems, which began the destruction of cultural and social capital within the community, which led to a decline in maintaining roads and other infrastructure, etc. The downward spiral was reversed when the local people and outside consultants came together as equals to combine their knowledge and change the direction of the spiral. The resultant actions led to an upward spiral of increasing assets across the capitals.

[103] In a community nearly destroyed by a tornado, the cultural, social, and human capitals were keys to mobilizing the political capital necessary to acquire the financial capital, which in turn was required to restore built and natural infrastructure.

[104] The project or investments in human capital instigated increases in social and cultural capital. Social capital increased by creating opportunities for youth and adults to work together and by bringing more people into the leadership arena. Project modified cultural capital to foster an increased acceptance of youth and other non-traditional leaders as important actors within the community. This interaction across capitals spurred the momentum to provide more opportunities to more kinds of people, leading to increased human, social, and cultural capitals. Because people began to imagine their community and themselves differently, crucial changes in political capital occurred. These changes led to more support for local businesses and efforts that influenced financial capital

the seven capitals in the framework in which one capital tends to be frequently deployed in community actions in a systematic pattern of combination with several others (Pigg et al., 2013).

5.4. Methodology

This chapter's broad purpose is to understand the effect of shale oil development on Major and Minor using the CCF and elucidate the interactions and inter-relationships among the community capitals. As a result, a qualitative methodological approach that provided flexibility and adaptability to discover and explore the stock of community capitals and the flows of community capitals was adopted for the study.

The data were gathered through 56 in-depth, semi-structured, and open-ended, questionnaire based face-to-face interviews and first-hand observation of behavior and interactions in Major and 37 similar interviews in Minor. When needed to ensure adequate information gathering, the original questionnaire was adjusted and fine-tuned as the interviews progressed. Each interview lasted between 45 and 60 minutes and was conducted between May and August 2014. Field notes were taken to understand the setting and contexts of the interviews. Participants were recruited using a modified approach described by (Biernacki and Waldorf 1981), where the sample initiation and progress was deliberately developed and controlled. Biernacki and Waldorf (1981) notes that initiating multiple referral or sampling chains represents greater sensitivity and attentiveness to information related to the study's focus. Contacts and referral chains were initiated using several methods: (1) university Extension service in both communities; (2) personal acquaintances of friends and family; (3) key-informants identified during pre-study efforts. Once the initial contacts were identified to start chains, further participants were recruited snowballing off of original participants through referral sampling.

The study population was left unspecified and interviews were continued until reaching a saturation point at which no new information emerged. Probes were used whenever necessary. Interviews were recorded with participant consent. Participants were encouraged to express their ideas and thoughts freely with guaranteed anonymity. Table 5 outlines the characteristics of the study participants.

Table 5. Characteristics of the Study Sample

Description	Minor	Major
Demographics		
Male	21	34
Female	16	22
Total	**37**	**56**
Age		
60+	12	18
Below 60[105]	25	38
Total	**37**	**56**
Residency		
Longtime[106]	23	31
New comer	8	11
Returning resident[107]	6	14
Total	**37**	**56**
Occupation		
Public Service[108]	10	11
Non-oil service[109]	7	12
Oil Industry	7	8
Retired	3	5
Owns a business	4	9
Not employed[110]	1	5
Farming and Ranching	5	6
Total	**37**	**56**

[105] No one below 20 years of age were interviewed
[106] Longtime resident: More than 8 years or continued residency in the community. Since the boom in both communities started around 2005. Residents who lived in the community more than 8 years could be considered longtime residents.
[107] A resident who was born/raised in the community, moved away and came back within the last 8 years.
[108] County, city, social services, law enforcement, and education etc.
[109] Retail, recreation, restaurants, and health care etc.
[110] The non-employed were the wives/girlfriends of oil industry employees.

The interviews were transcribed and analyzed using qualitative/ inductive coding and analysis methodologies. Moran, Franks, and Sonter (2013) propose that the challenge of identifying connections of components within and between capitals can be approached by explicitly separating capitals and the flows of capital, so-called capital fluxes. An advantage of separating capitals and flows is that decisions that result in an effect in one of the items in a capital can be tracked to changes in others via pathways for the connection and identification of the associated flux indicators (Moran et al. 2013). Similarly, in their study Emery and Flora (2006) systematically sorted qualitative and quantitative data into the appropriate community capital. As a result a two tier coding approach was undertaken.

At the primary level data were coded (structural coding/open coding) to represent different types of capital and assets that constituted each type of capital. The definitions of different types of capitals highlighted by Flora and Flora (2013) were used as a guideline for coding. For example, social capital was coded using assets such as mutual trust, reciprocity, working together, and collective identity. At the secondary level, data were coded (thematic coding) to represent relationships and interconnections between different assets within each community capital. The data under each capital were assimilated to represent major themes and consistent patterns, which led to the development of the graphical representations presented in the findings. Finally, a modified respondent validation approach (Torrance 2012) was used to improve validity and reliability of the findings. Members from the study communities that were identified during the referral sampling process but were not interviewed were presented with the findings and major themes to check for accuracy and validity.

5.5. Findings

The findings are organized into four sections. The first section provides a brief background on both Major and Minor, which sets the context to understand the findings. The second section analyzes the context of the two communities before shale oil development, which represents a period of economic/financial and population decline. As a result, the period before oil development provides a context to analyze the spiraling-down process. The third section describes the context of the two communities after shale oil development, which represents a period of economic/financial and population increase. As a result, the period after oil development provides a context to examine the spiraling-up process. The forth section describes the community development challenges that need to be addressed in both Minor and Major.

The findings show that instead of spiraling-up or spiraling-down, the overall interactional direction of the capitals represent a dual-effect, i.e., an increase in one capital leads to an overall increase in another capital (s), while at the same time causing an overall decrease in other capital(s). Similarly, a decrease in a capital leads to an overall decrease in some capital(s) while causing an overall increase in other capital(s). In addition, the specific interactions among capitals appear to be multi-dimensional in nature; an increase in one capital only causes an increase in certain assets of a capital (which leads to an overall increase) while it may have a neutral or negative impact on other assets within the capital.

5.5.1. Major and Minor Before the Boom

Oil booms are not novel experiences to either Major or Minor. The last oil boom in both Major and Minor ended during the early 1980s. Since then agriculture has been the main driving force of the economy. Although few oil jobs were available in both Major and Minor, these jobs were in production rather than in exploration. As county seats, both Major and Minor had state

and county jobs. There were few service businesses in either community; the schools and the hospital were main job creators. A participant in Minor described the situation:

> "We always had an advantage as the ag and county offices and all the things that follow that are here. That always added several jobs. The other thing is we have two big machinery dealers. All of those things bring people to town. In this area there are no machinery dealers to the north."

Compared to Minor, Major was considered an area hub city. As a result, Major enjoyed the benefits of an airport and local state college. Major also had more community amenities and services such as retail, dining, and recreational choices. In addition, the oil industry was an employer in Major as outlined by a longtime resident:

> "It was mostly agriculture. We did have people working in the oil industry just not to the extent. You had the government, teachers, hospital, small businesses, the county jobs, college jobs and so on. There was variety but nothing major stood up except for agriculture."

Both communities had basic services and amenities such as a movie theatre, parks, grocery store and hardware store. In terms of build capital, the majority of housing in Minor consisted of single-family homes (there were two duplexes for low-income or senior residents) whereas Major had a mix of apartments and single-family homes.

5.5.1.1. Spiraling- Down?

The agricultural industry has been consolidating for many years. Large farms provided fewer job opportunities and led to lower population density. Those in farming/ranching or with other established economic ties remained in the area, while the lack of economic opportunity, especially for young people, caused out-migration. Between 1980 and 2000, the population in

Major decreased by 7%, whereas the population in Minor decreased by 22% during the same period. The percentage of young people in Major and Minor both decreased by 3.1% and the percentage of elderly increased by 1.4% and 2.2%, respectively, from 1990 to 2000. The decline in young population and increase in elderly represents a decrease in human capital. During the same period the total number of housing units in Major and Minor decreased by 3.0% and 2.0%, respectively. Similar sentiments like the one below were expressed by residents in both Minor and Major:

> "The economy was not good. School populations were declining. We were big enough that they would have probably never lost its school. So there was fewer and fewer children in the community and lot of older people. It was hard for family owned businesses to keep their doors open. Even chain type of businesses were leaving the area. For a long time there has been two grocery stores here. The second one closed and then reopened with new ownership and they weren't able to make a go of it."

Therefore, the declining human capital resulting from a lack of economic opportunity led to a subsequent decrease in built capital. However, at the same time the social capital in both Minor and Major strengthened, which acted as a countering force against the decline in financial-human-built capitals. For example, a resident in Minor noted:

> "The community worked together well to get things done. You had to. For example the hospital was added on or built before the oil boom. Our bowling alley and movie theater used to be volunteer-run organizations. The school was doing OK. So those things were all very positive during that time. There used to be a lot of community stuff where people did things in the community. There used to be picnics in the park or some group got together or whatever"

The community members of both Minor and Major made sure that community amenities such as the theatre, parks, recreation choices, school, and other services in the community were functioning through volunteering and working together. Social capital in both communities comprised of a strong density of acquaintance, norms of reciprocity and trust, and close ties, which led to the presence of strong bonding social capital, as one longtime resident of Major described:

> "Everybody worked to make it a good community. I've never lived in a community that was so giving and always putting on things for people to do. Whether it's free feeds or concerts in the park. You could let your kids run around town all day long and not worry about it. Everybody felt safe because you knew everybody pretty much."

The cultural capital in both Major and Minor also strongly established during this period. According to the 2000 census 98.6%[111] and 93.7% of the population in Minor and Major were white or of Caucasian origin, as one longtime resident in Minor described:

> "Before the boom it was just the normal Norwegians and Germans. Just the people who grew up here. I guess it's like that Mayberry experience you know you keep on knowing everybody and on with your slower pace and slower life."

Many participants described both Major and Minor during the period before the boom with reference to "Mayberry." As agricultural based rural way of life shaped the cultural capital in both Major and Minor, a strong social capital and an established cultural capital contributed toward a stable political capital. As a result, both Major and Minor had longtime mayors (Minor

[111] The rest of the 1.4% were Native Americans.

had the same mayor for eight years and Major had the same mayor for 20 years; both retired in 2014) and relatively unchanged city councils during the period before the boom.

A process of spiraling-down, resulting in a loss of hope and direction, as described by Emery and Flora (2006), was not observed in either community. The analysis of the interactions among community capitals during the period before the boom symbolizes an overall declining trend in financial-human-built capitals. However, stability and strengthening of social-cultural-political capitals instigated a countering process, which prevented the manifestation of the overall spiraling-down process. Figure 13 outlines this process. All the participants were asked how they perceived the community if the boom never happened. Similar sentiments to the comment of a resident in Minor were expressed by participants of both Major and Minor:

> "I don't think the community was hurting. We had a good community. More elderly people but still enough people that operated the buildings, volunteered in the community, and other things in the community. It wasn't dying. For a small community we were lucky we had a grocery store. We were lucky we had one drug store, we kept one hardware store we kept one clothing shop. We had one little motel here. We've been quiet lucky we have a bowling alley. It's only open during the winter. We've had a theatre all these years. That's a community run theatre. We have volunteers sell the tickets sell concessions and stuff to keep things going I guess that's probably why our community has stayed or hung in there."

Although the reduction in financial capital caused a reduction in human and built capital, a simultaneous improvement occurred in social capital and cultural capital. This process was common to both Major and Minor. Therefore, a decrease in one capital (financial) caused a

decrease in other capitals (human and built), while at the same time stabilizing and strengthening other capitals (social, cultural, and political) or a downward "dual-effect."

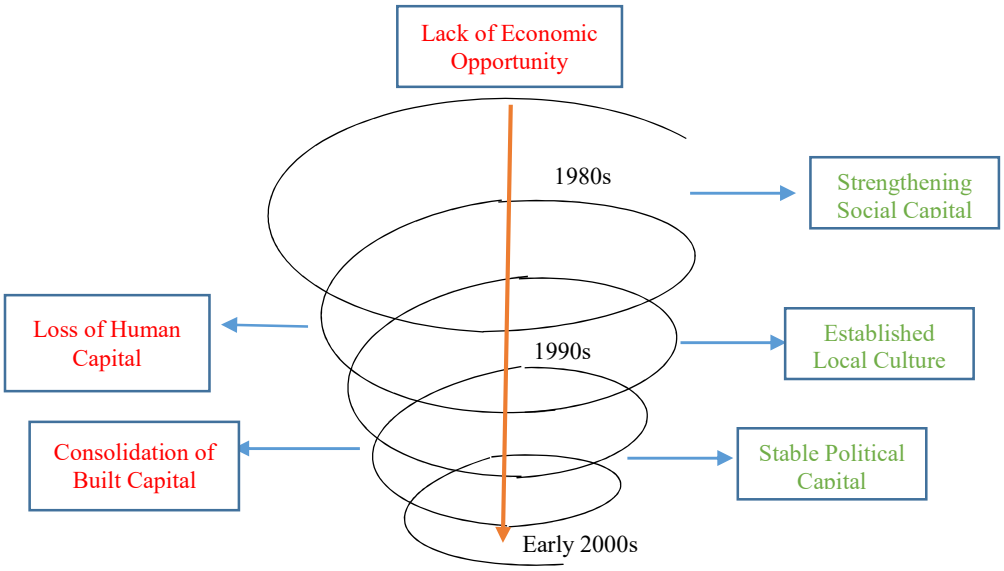

Figure 13. Dual-Effect before the Boom

5.5.2. Major and Minor After the Boom

The oil industrial activity in both Major and Minor started to increase around 2005-2007. Total oil production in the counties where Major and Minor are located, increased from 3.4Mn and 223,000 barrels in 2005 to 49.2Mn and 79.3Mn barrels, respectively, in 2013. This increase in oil production represents the increase in level of activity and the economic opportunity created by shale oil development. One longtime resident from Major described what the community went through during this period:

> "For the first couple of years everybody were kind of like is it here or is it just gonna be here for a little while and move to the next place. We had all these people come in. But when companies like EOG started building a headquarters in town, that was when people

started realizing a long-term to this. We've had investments seekers from all 50 states and overseas. We're seeing overseas money coming in too."

5.5.2.1. Spiraling-Up?

The infusion of outside financial capital created many jobs, which attracted many people to both Major and Minor. As a result, the human capital is changing in both Major and Minor. Before the boom outmigration of young people was a significant issue. But the boom completely reversed that trend. A participant from Major noted: "we're gentrifying from being a very retirement heavy community to being young families, young kids. Having young families here comes with the growth and it's an indicator that we got a future ahead of us." A public official in Major highlighted:

> "Now we have a younger population. The birth rate at the hospital is way up too. Before the boom there might be 200 or 210 births a year something like that and last year it was 750 and this year they're expecting it to go over a 1000. It's real significant changes and its happened in such short period of time too."

During 2000-2010 the population in Major and Minor increased by 18% and 14%, respectively. During the period 2010-2013 the population in both Minor and Major increased by 41%. The increase in financial capital led to an overall growth in human capital, where the total population in both Major and Minor increased, through new people and returning residents moving into the community. But, it also caused an out-migration of longtime residents. Many elderly longtime residents moved out of both Major and Minor as described by a resident from Major:

> "Some have been forced to leave. Some make a choice. Because again they don't want to be in the chaos. They could get good money for their home. If their family isn't here. So you just leave. I don't know I might leave, I don't know. It will be hard because we're

from here. I'm sure we're not the only ones looking at it. I know a ton of people who have gone."

Similar sentiments were described by participants in Minor. A participant from Minor stated: "absolutely. It's the people that build the area, know the area, know the needs, know the people, so that core part of the community. They have moved on. It will be a void." As a result, the interaction between financial and human capital is multifaceted and multi-dimensional. But overall, both communities are experiencing a growth in population, expansion in skills, and more young people in the community (overall growth in human capital).

The population influx created a significant demand for community services and amenities, which ignited growth in built capital in terms of housing, retail, dining, and recreation choices in both communities. A park district employee from Major noted:

> "When the boom started it changed everything. We were a poor park district. We were already struggling to maintain what we had. Lot of our stuff was old. Since 2012 we've done over 5Mn in projects in existing parks and we opened up a $75Mn REC center. We went from 13 full time staff to 43 fulltime staff. I'm pretty confident that we're the fastest growing park district in the country. We went from 1.2Mn budget to 14Mn plus this year."

Both communities experienced a growth in built capital fueled through market mechanisms (e.g. housing, retail, recreation, dining, and other service business buildings). However, growth in infrastructure aspects of build capital (e.g. roads and schools), which is dependent on state funding has been a huge challenge for both communities as noted by a public official from Major:

> "Now we see apartments coming online and now we're starting to see single family homes coming. We need to add things like roads, adding new fire holes, adding new police sub stations, adding cars, police cars fire trucks, dump trucks, waste water treatment facility, land fill expansion, city government building expansion. The infrastructure build up that's probably the biggest thing. We cannot do this on the backs of the local residents by taxing the local residents. We just need the state to step up and do a little bit more than what they're doing."

As a result, the interactions between financial and built capital also appears to be multi-dimensional. Private amenity assets of built capital (e.g. housing, retail, and dining) have been realized through an infusion of outside financial capital, whereas the infrastructure aspects of built capital (e.g. roads, schools, and water and sewer systems), which depend on political capital (i.e. the ability of local leaders to secure funds and the willingness of state level leaders to apportion the necessary funds) still remains a challenge. However, the data presented above show that growth in financial capital as instigated an overall growth in human capital and built capital. However, the changes have had a significant negative impact on social capital. A longtime resident in Minor noted:

> "The core parts to the community were the closeness of the residents most everyone knew each other so was very easy to get business done or to find out information. You know everybody kind of knew everybody. That has changed. A good example where I live, I have three or four houses around me, I have no idea who lives in them. Just don't know who they are don't see them or may be see them getting in to their car and drive away. You've lost that community feel in my mind. I mean there are so many people that

I don't know who live right across the street from me and next door to me I don't know who they are."

The influx of people, changes in the community, and outmigration of longtime residents disrupted the trust, norms of reciprocity, density of acquaintance, and networks in both communities.

The cultural capital in both communities is also undergoing a period of transformation. One participant from Minor stated:

"In terms of challenges for the people who live here the cultural shock. Say for example the latter day saints now they've applied for a building permit on the north side of town to build a large church. Right now I believe that the LDS church has the second largest congregation in the community. We see things that we haven't seen before like the door to door Mormons the door to door Jehovah's Witness. We never saw these things before."

A participant from Major highlight:

"It is just being more diverse. We were all the Norwegians the Germans in here so it's just more diverse. I have seen a lot of the southern influence. The Lousians the Texans Like when they cook for events and stuff you're starting to see gumbo and jambalaya and you kind of see that slowly engrained into the city. It is pretty cool."

Participants from both communities highlighted changes in cultural capital in terms of changes in ethnic diversity, changes in food choices, changes in lifestyle, and changes in religious diversity. The religious, ethnic, and cultural choices were viewed in a positive connotation, whereas changes to lifestyle were viewed in a negative connotation as described by a longtime resident in Major: "it is not the old community you know anymore. No matter what

you do it's not coming back. It has changed forever. You have to be a little bit more diligent. You have to be a little bit more aware of your surroundings." As a result, the growth in human capital improved the perception of diversity aspects of cultural capital, but perceptions on the way-of-life aspects of cultural capital is perceived as having deteriorated.

Political capital in both communities also changed as a result of changes in human, social, and cultural capitals. Both Major and Minor held local elections shortly before the interviews of the study were done. During the elections, two new mayors were elected in both Major and Minor. Two members of the city council in Minor were newcomers to the community, whereas all the newcomer contestants in Major lost in the elections. One participant from Major described the change in political capital and community leadership:

> "It is starting and it's slow and hard. We just had an election a few months ago. It really became between new and old. Almost every position was someone who was relatively new here and someone who's lived here most of their life and the voters sided with the old people every time. But what it did do is it created an opportunity for new people to have a voice. The new people are stepping up and saying we want to make a difference. I think that's a slow process. All the new people lost this year but I'm interested in seeing what happens in another two years when another city election comes."

The data presented above show that after the boom both Major and Minor experienced an overall growth in financial-human-built capitals. However, a similar growth was not observed in social-cultural-political capitals. As a result, a process of spiraling-up as presented by Emery and Flora (2006) and Stofferahn (2012) was not observed in either Major or Minor. The data show that growth in human capital had a negative impact on social capital and a mixed impact on cultural capital. The overall effect on political capital cannot be determined at this point and will

require a longer period of time. As a result, an increase in one capital (financial) resulted in an increase in other capitals (human and built) and simultaneously caused a decrease in another capital (social), or an upward "dual-effect." Figure 14 highlights this process. The interactions among specific capitals, such as human-cultural and financial-built, are multi-faceted and multi-dimensional.

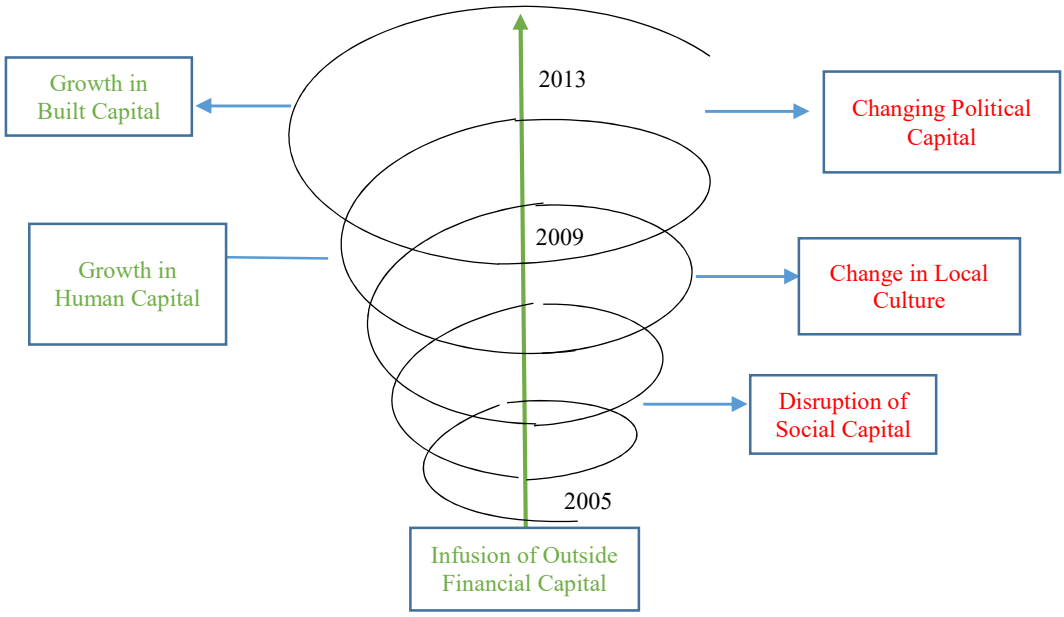

Figure 14. Dual-Effect after the Boom

5.5.3. Community Development Challenges

Data from both Major and Minor highlight two key challenges. First, infusion of financial capital positively affected human capital and some aspects of build capital. More state support is required to build up the infrastructural aspects of build capital (as a result, the flow between political capital and build capital is represented by a broken arrow in Figure 15). Second, a particular stock and quality of social and cultural capital existed in both communities prior to shale oil development, which has been disrupted because of the changes caused by oil

development. As a result, local policy makers and practitioners must develop strategies to transition the old social capital and cultural capital to a new social and cultural capital. The new social and cultural capital will potentially shape a new political capital in both communities. Figure 15 highlights this process. One of the participants in Major described this process: "there aren't a lot of neighborhoods in our community that has been established or stable yet. They're still building neighborhoods. I would anticipate in the next couple of years that piece would come along but it's not yet here."

Similarly, a newcomer to Minor noted:

> "As far as for myself I still feel like a little bit of an outsider just because I haven't found a good fit for myself as far as in the community to do community services and things like that. I used to do jail ministry and I used to do all other things and I haven't just got that yet. That trust takes time to build I guess. So basically I'm really with my family and I'm focusing on raising my kids."

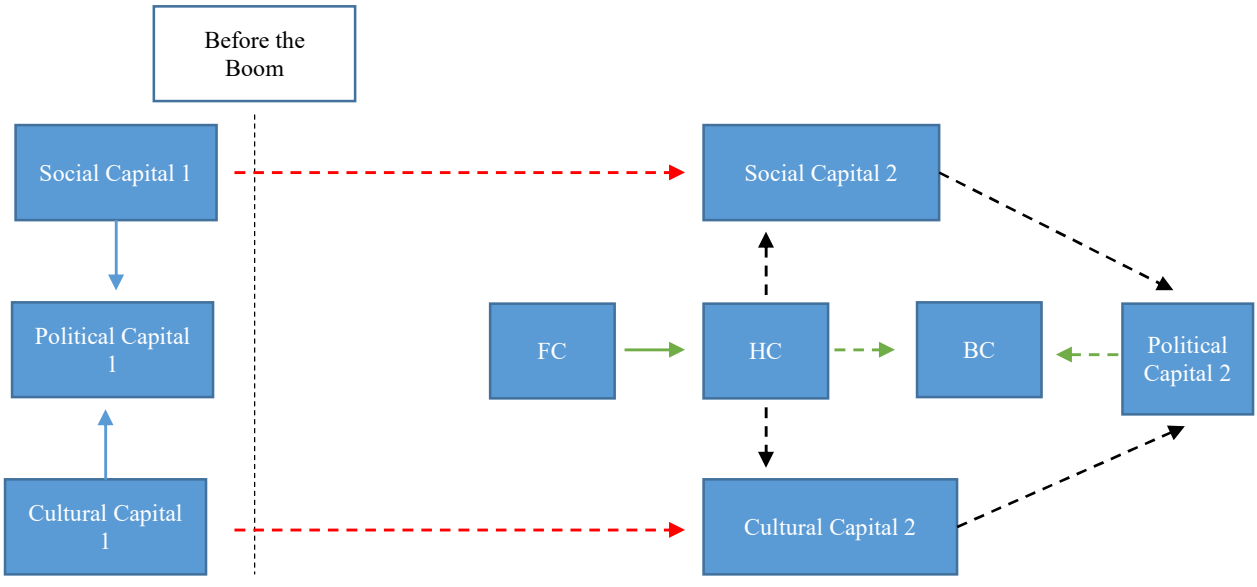

Figure 15. Long-Term Community Development Process

Both Major and Minor offer many avenues to integrate newcomers into the community. The local schools, churches, local parks, and community organizations and clubs (e.g. Rotary and Lions) represent integration avenues common in both communities. One participant from Minor noted: "the school is the starting place for most families. Because you can meet new people when you go to the sporting events. You meet new people when you go to your kids programs. You get involved." A public official from Major also noted: "we have this really neat thing on this Saturday called welcome to the community event it's been going on five years. It's something started by one of the local companies and churches. Just a day of welcome to the community. They've been doing it for five years."

In addition to the common avenues, the new community recreation center or the Area Recreation Center (ARC) in Major presents an important avenue for building social capital. One of the employees at the ARC noted:

> "There was a young couple playing racquet ball about a week after we opened. I just stopped and introduced myself. [They said no thank you!!! We lived here for six months. We don't go to the bars. We've met more people in the two weeks that you've been open that are our age that have the same interests as we do. We actually have two more couples we're actually going to join a co-ed volleyball league. That would have never happened without this place. We just met them hanging out here.] This building has changed that dynamic of meeting people and making friends."

As the networks and relationships develop and establish there is potential for building a new social capital. One of the participants in Major described this potential:

"It is not going to be the neighborhood community that used to be in the past. I see it as a strong community and I see the community stabilizing. I see it as a very viable and strong community. It will be a good community to raise children in."

The cultural capital will also need to undergo a similar process of stabilizing at a new equilibrium. One of the participants in Minor described:

"I think after the boom people from different places and different cultures came in. I just felt that it was good for all of us. You know it brought probably some understanding from different parts of the world to our kids they were kind of very sheltered and so when that happened it just brought a lot of different diversities."

The variety of food choices, the new churches, and the ethnic diversity has the potential to transform the cultural capital and build a new cultural capital. The cultural capital and social capital would contribute towards shaping a new political capital. A participant from Major noted:

"I think the leaders in a community have to be invested in that community. I think it would take another 4 to 5 years before we see somebody [new] I think that's true in any community. You don't move somewhere and jump into a mayor position. You don't move somewhere and jump into a park board position. You have to learn what's going on and develop your networks."

Based on the findings of this study, it can be concluded that infusion of financial capital during a period of rapid shale oil development does not necessarily lead to a process of spiraling-up. As a result, practitioners and policy makers must facilitate the process of community development through better cultural and social capital building strategies. Analysis of the interactions among capitals in both communities before and after the boom shows that specific

interactions are multi-dimensional and the overall process represents either an upward or downward dual-effect.

5.6. Discussion

Findings of this study presents important implications for researchers, practitioners, and policy makers. Stofferahn, (2012) argued that cultural, social, and human capitals were keys to mobilizing the political capital necessary to acquire the financial capital, which in turn was required to restore built and natural infrastructure following a disaster. Similarly, the findings of this study shows that both Major and Minor require increased state assistance/funding and a strong political capital capable of acquiring the necessary funding, in order to address the infrastructural challenges presented by rapid energy development. This fact presents implications for state level policy makers in terms of support necessary for rural communities experiencing rapid shale oil development.

Emery and Flora (2006) noted that in the spiral-down period, the community declined in all capitals, resulting in a loss of hope and direction. However, this study provides evidence that during a period of decline in financial-human-built capitals, the overall community decline was moderated through strengthening of social capital, which provided stability and resiliency to the community. As a result, investment in social capital presents an opportunity to impede the spiral-down process. Shale oil development instigated an overall growth in financial-human-built capitals. However, a similar growth did not materialize in social capital and, as a result, the process of spiraling-up was not observed in either community. Similarly, Emery and Flora (2006) noted that the usual rural development strategy of beginning with infusions of financial capital or built capital is often not cumulative. In addition, they also identified social capital as the best entry point to spiral-up. Therefore, for policy makers and practitioners, the findings of

this study reiterate the importance of investing and building social capital irrespective of whether the community is in an upward or downward evolution.

The results of this study postulates the idea of a dual-effect to represent the overall interaction among capitals. The findings of this study are consistent with those of Pigg et al. (2013) in that the community capitals tend to cluster, and the clustering effect appears to be related to the nature of the desired primary effect. Therefore, policy makers and practitioners need to design and implement multiple interventions to realize the process of spiraling-up during a period of rapid social-and economic transformation. In addition, the interactions among specific capitals were multi-dimensional in nature, which is consistent with the findings of Pigg et al. (2013). However, the findings are based on a case study, within the context of a community experiencing rapid energy development. Therefore, future studies and researchers must further examine the dual-effect in other community contexts. Every effort was taken to ensure that different assets within capitals were placed in the most appropriate capital categories. However, certain assets, especially in financial, political, and social capitals presented subjective judgmental challenges in terms to which capital the assets belonged. Researchers focusing on capital interactions must pay careful attention to this methodological challenge presented by the CCF.

The disruption to social and cultural capital caused by shale oil development and concomitant population influx is consistent with the literature on social disruption hypothesis and social impact assessment. Other impacts or changes highlighted by participants of both communities are consistent with the pertinent literature. However, use of the community capitals to perceive shale oil impacts/ changes produces several important policy implications for managing the impacts. First, the need to invest in solidifying social capital presents an important

addition to the literature that presents an opportunity to negate the impacts of social disruption and position the communities on a process of recovery. Second, the interactions and interdependencies among the capitals highlight the importance of adopting a holistic or systemic approach towards managing the community impacts during shale oil development. As a result, the use of CCF presents an opportunity for communities to adopt a more comprehensive strategy towards community development, rather than trying to address different boom impacts in an isolated manner.

There are several limitations of this study. Although two communities were studied that differed in nature and size, both communities represent cases of rural communities undergoing periods of rapid energy development. As a result, the broad applicability of the findings to other rural communities might be limited to similar rural communities experiencing rapid shale oil development. This study did not analyze the impact of rapid shale oil development on natural capital. The technological processes and activities involved in horizontal drilling, oil fracking, and the implications of such on the natural capital system requires a lengthy discussion that is beyond the scope of this chapter. Future studies can focus on these issues. During data collection, participants expressed concerns such as dust, noise, impacts on air quality, and concerns of water pollution. Therefore, the impact of rapid shale oil development on the natural capital is proposed as a vital area for future studies.

5.7. Conclusion

Shale oil development has caused several positive and negative effects or changes in Minor and Major. This study looks at these impacts and changes through the lens of community capitals to understand the interactions among the capitals and the challenges that need to be addressed to realize the community development potential created by oil development. The

findings of this study indicate that the overall process of interactions among the capitals represent a dual-effect: an increase in one capital leads to an overall increase in other capital (s) while at the same time causing an overall decrease in other capital(s). Similarly, a decrease in a capital may lead to an overall decrease in other capital(s) while causing an overall increase in other capital(s). In addition, the specific interactions among capitals appear to be multi-dimensional in nature: an increase in one capital only causes an increase in certain assets of a capital while it may have a neutral or negative impact on other assets within the capital.

Overall, in both Minor and Major, the infusion of financial capital has positively affected human capital and some aspects of build capital. More state support is required to build up the infrastructural aspects of build capital. The findings highlight that understanding and guiding how the social and cultural capitals are changing and how those changes would shape political capital is the main challenge facing both communities.

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6. HOUSING FOR ESSENTIAL SERVICE WORKERS DURING AN OIL BOOM: OPPORTUNITIES AND POLICY IMPLICATIONS

6.1. Abstract

This chapter analyzes the affordability of housing in two counties in western North Dakota, during a period of rapid economic and population growth, triggered by increased oil industry activity. The focus is on affordability issues of essential service workers − such as teachers, nurses, police officers, and local government employees − who are also the middle income earners in a community. Findings presented in the chapter shows that essential service workers face considerable housing affordability issues, because of the housing market conditions generated by the economic and population growth. Findings also show that conventional housing assistance programs are of little use to solve the affordability issues of essential service workers. The study further explores three models or mechanisms that could be used to improve the affordability of housing: a community land trust (CLT) model, a property tax exemption model, and a low interest model. Analysis shows that the CLT model has considerable financial potential towards provision of housing that is affordable to essential service workers.

6.2. Introduction

The upsurge in oil drilling activity stimulated by high prices and fracking technology has created a social and economic transformation in rural western North Dakota, which is frequently referred to as an “Oil Boom.” The increased oil drilling activity has created many jobs, which attracted people from all around the country, looking for an economic opportunity, during a time when the American economy was trying to recover from the worst recession since the great depression.

The rapid growth in population has generated a swift increase in demand for essential services such as law enforcement, education, health services, and local government services. The increased demand for essential services has created an urgent need to recruit more employees. However, recruitment remains an enormous challenge because of the lack of adequate and affordable housing. Potential professionals expect a standard of housing that has been highly inflated due to the housing benefits provided to oil industry professionals. For example one of the public officials described during the study:

> "If staff is required to find market rate housing that makes it difficult to obtain that staff. For instance we made an offer to an engineer to come to the community. He came to visit, he couldn't find a housing unit that would meet his needs and he actually said it's cheaper to live in San Francisco California than it's is in Dickinson North Dakota. So he declined our offer. That was a direct result of housing costs. That's a good example of what housing does to us."

Several media accounts and other reports from the area have also highlighted the issue of lack of housing affordability. Essential service personnel such as teachers, police officers, nurses, and local government officials are a critical part of the community fabric. A community needs a healthy and sustainable supply of employees in these categories to meet the demands of a growing population. Interviews with public officials during this study revealed several instances where the public services had to come up with unconventional housing solutions such as use of FEMA trailers for their employees. But these solutions are only temporary and hiring the necessary personnel remains a significant challenge, because of lack of affordable and suitable housing. Therefore, there is a strong need to study the condition of the housing market, the effect on essential service workers, and develop policy to address the issues. As a result this study aims

to: (1) review housing options available for essential service workers, such as teachers, law enforcement officers, nurses, and local government employees; (2) assess the affordability of housing options available; (3) investigate the tools and mechanisms available to improve the affordability of housing for these groups; and (4) provide recommendations pertinent to regional housing policy.

This chapter focuses on the housing conditions of two counties in western North Dakota. The first is Williams County, located in the heart of the Bakken shale formation. The Williams County seat is Williston, considered by most to be the oil capital of North Dakota. The second is Stark County, which is located at the geographic edge of the present oil activity, as shown in figure 15. Dickinson is the seat of Stark County. Both Dickinson and Williston are considered hub cities, which feature retail stores as well as public and private services for nearby agricultural and industrial activity.

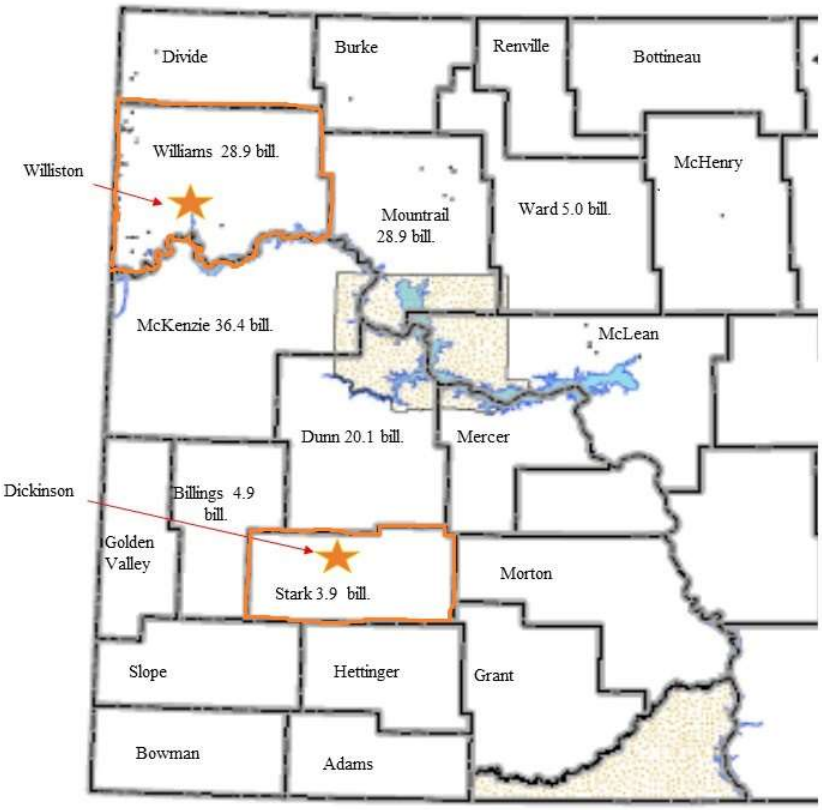

Figure 15. Map of Oil and Gas Producing Counties in Western North Dakota
Source: ND Department of Mineral Resources

The chapter is structured as follows. The literature review section summarizes the main concepts and the theoretical framework. The methodology section describes the approach adopted for data collection and analysis. The combined findings and discussion is organized into five sections: (1) for-sale analysis of housing in the two counties; (2) affordability of rental housing; (3) shelter poverty scenarios for essential service workers; (4) analysis of housing assistance programs; and (5) options for improvement of housing affordability for essential service workers. The chapter ends with a brief conclusion.

6.3. Review of Literature

Literature on housing is broad and varied. The focus of this literature review is three fold: (1) define housing affordability within the context of this study; (2) identify factors that affect affordability of middle income earners; (3) summarize factors that affect home ownership during periods of rapid economic growth.

6.3.1. "Affordable Housing" and "Housing Affordability"

Although interchangeably used, 'affordable housing' and 'housing affordability' are two different but interrelated concepts (Chowdhury 2013). Affordable housing can be thought of as physically adequate housing that is made available to those who, without some special intervention by the government or special arrangement by the providers of housing, could not afford the rent or mortgage payments for such housing (Field 1997, Chowdhury 2013). Housing that is affordable to a specific income group in terms of price may not be suitable for them to live in due to social norms, living environment, housing quality or any other local social issues. As a result, more specifically, affordable housing may be referred to as housing of a standard commensurate with socio-economic status that is made available through some intervention or mechanism, at a price within the standards of affordability to buy or to rent (Chowdhury 2013)

Affordability is frequently interpreted as the relationship between household income and housing expenditure (Kutty 2005). As a result, affordability refers to whether the households can reasonably be expected to meet the consumer cost – rent or mortgage payments plus any other items such as repairs – of housing suitable for their needs without getting into hardship or risking actual difficulty (Bramley 1992). Therefore, "affordability" can have meaning only if four essential questions are answered: affordable to whom; on what standard of affordability; for how long; meeting what physical standard (Stone 2006). Affordability expresses the challenge each

household faces in balancing the cost of its housing, on the one hand, and its non-housing expenditures, on the other, within the constraints of its income. Ratio of housing costs to income is widely accepted as an appropriate indicator of affordability and the simple "rule of thumb" is housing costs below 30% of income. But these conventional percent-of-income affordability standards don't consider the household size and the impact of housing costs on disposable income availability (Stone 2006).

Housing costs are regarded as a preeminent item in the household budget. Housing expenditures could cause many households to reduce their expenditures for food, clothing, health care, education, and other human capital investments (Stone 1994). Expenditures for these basic needs can be seen as vital for a household. So it is important to focus on household capacity to afford such basic goods after paying for housing (Kutty 2005, Chowdhury 2013). For example, a single person and a family of four making the same income might face different difficulties when it comes to meeting the costs of household necessities. As a result alternative sliding scales based on the family size and income are more effective in gauging affordability (Stone 1994). Once a household has paid housing costs, if the remaining income is not enough to cover the basic non-housing necessities, Stone (1994) terms such households as "shelter poor." Similarly, Kutty (2005) outlines that a household that cannot afford the poverty basket of non-housing goods after paying for housing as being in housing induced poverty (Kutty 2005). Stegman et al. (2000) outlines that a family is defined as having critical housing needs if it spends more than half its total income on housing and/or lives in a severely inadequate unit. From a policy standpoint, it is important to understand which households cannot pay for non-housing needs after paying for housing, because they are likely to be in a more precarious position than those that have high cost burdens but can still pay for minimal non-housing consumption. Kutty (2005) suggests that

a sensible housing policy response would target housing subsidies to the households unable to pay for such non-housing goods. Other housing issues such as living in housing that fails to meet physical standards of decency, in overcrowded conditions, with insecure tenure, or in unsafe or inaccessible locations might be indirectly caused by affordability issues. Most households that experience one or more of these other forms of deprivation in reality do so because they cannot afford satisfactory housing and residential environments. As a result other forms of housing deprivation are largely due to the affordability squeeze (Stone 2006).

6.3.2. Housing Affordability of Middle Income Earners

Families with housing affordability problems come from different circumstances requiring different solutions. In some suburban areas, teachers, firefighters, or young families seeking their first homes may create the principal demand for housing affordability (Field 1997). As a result, the assistance that could place housing within the need's reach might involve cost reductions through land use and building code regulatory relief, the availability of creative financing that solves a down payment problem, or financial assistance (Field 1997). For lower-income families and individuals, subsidies can be essential tools for helping them gain stability and self-sufficiency (HUD 2004). As a result, the issue of housing affordability is neither a purely supply-side nor demand-side concern. Both supply and demand modifying policy instruments can have significant impacts on the provision of housing that is affordable (Chowdhury 2013). Demand-side instruments intervene in housing markets to increase the ability of people to rent or buy housing, whereas supply-side instruments intervene to reduce the cost of housing by directly or indirectly increasing housing supply (Chowdhury 2013). Nelson (2002) concludes that housing strategies should indeed be geared to local conditions. The fundamental forces of housing demand and supply continually generate different housing market

conditions in different locations. To most effectively provide housing to those with inadequate housing, programs should target areas and households with the most severe housing problems (Nelson 2002).

In a study focusing on new economy boom areas, Quercia et al. (2002) found that increased level of high-tech activity leads to critical housing problems for all households and especially for moderate- income households. The study found a stronger impact on moderate-income working households than on all households. The shortage of affordable housing reached extreme proportions in some new economy areas. As Quercia et al. (2002) outline, middle income earners such as teachers, police officers, firefighters, commissioned sales people, all people who make more than $50,000 a year and would be comfortably middle-class in many other places were seeking the services of homeless shelters in Silicon Valley. As a result, Quercia et al. (2002) conclude that policy must strive to meet the housing needs of moderate and middle income working families and not just the very poor.

Quercia et al. (2002) state that during times of economic expansion, private developers concentrate production at the high end of the market. If a particular type of housing becomes more profitable compared to other types, then producers of housing will focus more on providing that particular type of housing (Olsen 2001). Thus, in the short-run market period, several factors are likely to affect market valuations in general and households' affordability levels in particular. Among them are factors such as population changes both in terms of number and characteristics, including education levels, age, marital status, and others; the availability of government subsidies; the extent to which property owners can downgrade/upgrade existing stock; and other locational factors. In the short-run market period, no new construction can be put in place. Over the longer run, new construction can bring market valuations down because of increased supply.

However, if the economy continues to expand over a longer period of time, the rates of return from continuing to supply housing to lower-quality submarkets are likely to diminish in relative terms. Prospectively, relative returns will be higher from serving the higher submarkets, via new construction, upgrading, converting units to non-residential uses, or demolishing structures and replacing them with higher-quality, more intensive residential uses. The resulting higher market valuations will worsen the affordability problems of most households, regardless of submarket (Landis et al. 2001; Quercia et al. 2002).

When new affordable apartments become available, they are more quickly spoken for than other market segments. Many working families face the prospect of a lifetime of renting, because, in many areas, there are no homes to buy that they can afford. In particular, this is the case for many working renter families that have critical housing problems. Even if they were to rely on the most affordable mortgage products available, these families still confront the reality that homes are priced beyond their reach (Stegman et al. 2000).

Quercia et al. (2002) notes that the price pressures are greater in high-tech areas (or areas experiencing a new economy). Therefore, in the short run, high economic growth is expected to lead to an increase in critical housing problems. As a result, Quercia et al. (2002) argue that areas promoting high growth would do well to put in place housing programs to address the likely impact of such growth on moderate- income working households that still earn their living in old economy jobs. In areas experiencing rapid growth, these households, including teachers, police officers, firefighters, and other workers central to sustaining the communities, are likely to earn lower wages and have incomes that lag behind rising housing prices (Quercia et al. 2002).

6.3.3. Factors that Affect Home Ownership

Numerous factors such as income, educational level, relative cost of renting, price of housing, and balance between population growth and housing supply growth (Myers et al. 2005; Andrews et al. 2011; Quercia et al. 2002) affect home ownership. Evidence show greater homeownership gains in areas with greater rent increases- indicating lower relative costs of owning- and with greater house price increases- indicating greater investment incentives (Myers et al. 2005). Rising house prices might stimulate higher rates of home purchases by triggering an investment incentive that overrides affordability concerns. The purchase decision, of course, involves more than investment considerations. Demographic characteristics also play an important role in how consumers respond to market conditions (Myers et al. 2005).

Increases in employment can be expected to raise housing prices, while at the same time higher prices can also have a significant negative effect on labor force changes. Employment growth that increases housing demand and exerts pressure on prices ought to stimulate new construction, but is often subject to regulatory constraints that limit supply (Myers et al. 2005). In the short to medium term, an increase in housing demand, such as that caused by mortgage market deregulation, higher levels of economic activity, and in-migration, would translate into smaller increases in real house prices if housing supply is responsive.

Responsive housing supply is especially important to avoid bottlenecks in different segments of the market (Andrews et al. 2011). Stegman et al. (2000) notes that an affordable housing shortages threaten continued economic development. When new construction lags behind employment growth, shortages force up prices and restrict opportunities for new home purchases. Thus the balance between growth in employment and growth in housing supply is an important element in a region's homeownership rates. Housing construction that fails to keep

pace severely constrains opportunities for both household formation and homeownership (Myers et al. 2005).

Without a sufficient supply of adequate and housing that is affordable, employers and even entire regional economies can be at a competitive disadvantage because of their subsequent difficulty to attract and retain workers. Chakrabarti and Zhang's (2010) study of California municipalities show that a one-unit increase in the housing-price-to-income ratio reduces city-level employment growth by 1.6 percentage points over two years. The equilibrium land rents explain the underlying correlation between the two factors. Areas with less affordable housing tend to experience slower employment growth, because equilibrium land rents are so high, which constraints supply of land. Many land-supply constraints are actually man-made and created by land-use regulations. When high housing prices are sustained by tight land-use regulations, they lead to slower employment growth (Chakrabarti and Zhang 2010).

Housing supply may be constrained by both policy and non-policy factors. Geographical and demographic conditions – such as physical limitations on land for development and the degree of urbanization – can restrict housing supply in certain areas. Public policies that can play a role include land-use planning, zoning, and rental regulations. A constrained supply reduces the availability of housing and can contribute to regional price differentials and housing market imbalances. Large price differentials between areas, for instance, caused by rapid changes in housing demand within a region, combined with rigid housing supply, can reduce geographical mobility. Housing supply can be made more responsive through efficient land-use regulations. Apart from improving land-use regulations, providing infrastructure and other public services along with housing – such as road junctions, water, and sewer– is also likely to influence supply (Andrews et al. 2011).

6.3.4. Housing Issues during Periods of Rapid Energy Development

Few studies have focused on housing issues during periods of rapid energy development. Focusing on the Marcellus shale, Jacquet (2009) notes that increased oil and gas drilling results in a large number of workers moving into an area that put strains on housing, as existing housing fills up quickly. This labor in-migration results in a critical housing shortage. Severe housing shortages will invariably lead to skyrocketing rents and concomitant affordability issues. Patton et al. (2011) notes that families were allocating over 60% and sometimes up to 90% of their income for housing, in the Marcellus region subsequent to rapid gas development. Lycoming County (2012) notes that the limited supply of housing and the increased demand due to the growth in the Marcellus gas industry has resulted in rental rates that has made housing unaffordable for over 58% of the County's households, especially households with low to moderate incomes. Similarly, Komadina et al. (2014) records instances of two or threefold rent increases in areas experiencing rapid oil and gas development.

Traditionally, the negative impacts of lack of housing affordability are felt by those experiencing unemployment or living on low incomes. Ennis et al. (2013) argues that during rapid energy development, this group will grow to include middle income renters, who are simply unable to afford escalating housing costs. On a similar note, Schafft et al. (2014) shows that school personnel and longtime residents in Pennsylvania's Marcellus Shale region found themselves displaced from rental housing and were forced to ''double up'' with friends or family. Therefore, it can be clearly argued that rapid energy development leads to escalation of housing costs and concomitant affordability issues. In addition, new housing takes years to materialize, aggravating the problem (Jacquet 2009). Gilmore and Duff (1975) note that costs and pace of new housing construction is affected by factors such as high labor costs, shortage of

construction workers, and high supply costs and shortages (Gilmore and Duff 1975). As a result, even when new housing enables the supply to catch up to demand, the high construction costs might translate into high housing prices and rents, which might lead to affordability issues.

6.4. Description of Study Area

The population in Williams County grew by 32% and the population in Stark County grew by 16% during 2010-2013, within a period of just 3 years. Although these areas are traditionally considered to be rural, in 2013, 71% of the population of Williams County lived in Williston and 74% of the population of Stark County resided in Dickinson (US Census). Table 6 summarizes the population projections from 2010-2036 in the two counties. Bangsund and Hodur (2013) present three population projection scenarios (high, consensus, and low). It must be noted that these projections were produced based on assumptions such as oil price remaining steady between $70-$100 and the oil rig count remaining over 150 for a considerable period of time during the next two decades. Population projections summarized in table 6 come from the low scenario. This is because the drop in oil prices witnessed in 2015, caused drilling activity to drop below which was assumed in the Bangsund and Hodur (2013) report. As table 6 indicates, the population in both counties are expected to significantly increase in the next two decades. Employment includes both direct employment in the oil and associated industry and employment in service industries.

Table 6. Population Projections 2010-2036

	2010	2015	2020	2025	2030	2036
Population Associated with Permanent Workforce						
Williams County	22,398	37,785	48,093	52,906	56,473	56,876
Stark County	24,199	24,770	30,478	32,812	34,789	35,485
Population Associated with Permanent and Temporary Workforce						
Williams County	22,398	57,571	63,798	58,103	58,120	56,876
Stark County	24,199	31,393	36,774	35,168	35,557	35,485

Source: Bangsund and Hodur 2013

The need for housing in Williams and Stark Counties depend on the employment projections and the permanent population projections. The difference in total population projection and permanent population projection outlined in table 6 highlights the extent of temporary workforce that might support a home/family elsewhere. As a result, the housing needs of the permanent population and temporary workforce will vary. The oil and gas industry has a wide variety of housing needs with varying time frames. Drilling and fracking, infrastructure construction, and gathering systems' construction largely consist of a temporary workforce, who are often residents of other states and work in a location until the job is complete and then move on to the next job site (Bangsund and Hodur 2013). Temporary workforce housing needs are often met with hotels, company sponsored temporary workforce facilities such as man camps, campgrounds, and community's rental housing stock (Williamson and Kolb 2011). However, the increase in total population − inclusive of both permanent and temporary residents − of the two counties over the next two decades represent the increase in need for essential service workers.

Although it is not expected that temporary workers will bring families and schoolchildren to live with them, the increase in permanent residents will imply growth in school populations. Specific employment category projections − such as of teachers or police officers − were not

available. However, Bangsund and Hodur (2014) produced a projection of essential service employees from 2010-2036 in the two counties, based on broader employment categories such as educational services and healthcare and social assistance. This information is summarized in table 7. The projections in table 7 is an indication of the expected increase in essential service employees in the two counties.

Table 7. Essential Service Employee Projections 2011-2036

	2011	2015	2020	2025	2030	2036
Educational Services						
Williams County	901	2,006	2,730	2,948	3,088	3,230
Stark County	1,564	1,802	2,292	2,645	2,863	2,992
Health Care and Social Assistance						
Williams County	1,924	3,631	5,402	5,980	6,380	6,799
Stark County	2,785	3,143	4,295	5,109	5,595	5,855
Local, State, Federal						
Williams County	1,412	2,253	2,928	3,160	3,331	3,513
Stark County	1,144	1,377	1,808	2,114	2,299	2,400

Source: Bangsund and Hodur 2014

According to the 2010 Census, there was 6,442 owner occupied housing units in Williams County and 6,860 similar units in Stark County. These units include twin homes, town homes, and rural farm homes. According to the 1990 Census, there was 5,689 owner occupied housing units in Williams County and 5,827 similar units in Stark County. That's an increase in 13% of owner occupied housing units in Williams County and an 18% increase in Stark County over a period of 20 years. This is commensurate to the state rate of 17% over the same period. Renter occupied housing units grew by 21% in Williams County and 22% in Stark County during this period, compared to the state rate of 17%. The population in Williams County only grew by 7.5% and by 6.8% in Stark County during the period 1990 to 2010. However, the population in both counties decreased from 1990 to 2006 and increased- rather rapidly- from

2006 to 2010 with the onset of present boom. The occupied housing units per person only changed slightly in both counties from 1990 (0.38 for both counties) to 2010 (0.41 for both counties). As a result it can be argued that both counties didn't experience a significant shortage of housing during the period 1990 to 2010.

According to the HUD database, during the period from 2010 to 2013 a total of 5627 housing unit building permits were issued in Williams County and a total of 2914 similar permits were issued in Stark County. However, only 25% of those permits were issued for single family units in Williams County while 46% of similar permits were issued in Stark County. Based on this data it can be assumed that there is a shortage of single family homes at least in Williams County, even if all the permitted homes were build and made available for occupation. Based on this data it can also be argued that supply is adapting to the increase in demand.

6.5. Methodology

The aim of the study was to analyze the housing market conditions in the two targeted counties, determine the extent and the effect of lack of housing affordability on essential service personnel, and identify the mechanisms and tools that could be used to improve the affordability of housing. In order to achieve the aim, several types and sources of data were needed. In order to identify the challenges posed by the housing market on essential service personnel, sixteen open-ended, face-to-face interviews were conducted with county/city officials, school administrators, health staff, and law enforcement officers. Twelve similar interviews were conducted with housing contractors/suppliers from the two counties in order to identify the housing market trends, supply side challenges, and barriers. Participants were encouraged to freely express their view through guaranteed anonymity when writing about the findings.

When needed to ensure adequate information gathering, the original questionnaire was reshaped and fine-tuned as the interviews progressed. Each interview lasted between 45 – 60 minutes and was conducted between June and August 2014. Interviews were recorded with participant consent. The interviews were transcribed and then analyzed using qualitative/ inductive coding and analysis methodologies to identify the major themes and ideas. Rent data, fair market rents, and housing program assistance data were also collected to analyze the affordability of rental housing and housing finance assistance programs available.

Single family housing price data on 100 random properties available for sale during April-August 2014 were collected from property developers and real estate agents, to determine the affordability to single family housing. These data were collected on the biggest rural city in each county. Similar housing price data were also collected from Fargo, which is the biggest city in the state and is located in the eastern part of the state, for comparison purposes. Fargo, with a 2013 population of 113,658 is the biggest city in the state and is located in the eastern part of the state. Although the price date were the asking prices, the housing market in both Dickinson and Williston are supplier driven rather than buyer driven. As a result, these data can be considered adequately robust for an analysis. There was no accessible mutual listing service available in the two counties to gather house prices. Table 8 summarizes the number of houses in the sample by the number of bedrooms.

Table 8. Summary of the Housing Sample

Bedrooms	1-2	3	4	>4
Dickinson				
Built>5 years	6	14	23	8
Built<5 years	6	13	16	14
Williston				
Built>5 years	6	10	14	6
Built<5 years	5	24	21	14
Fargo				
Built>5 years	7	17	27	12
Built<5 years	5	11	15	6

6.6. Findings and Discussion

The combined findings and discussion is organized into five sections: (1) for-sale analysis of housing in the two counties; (2) affordability of rental housing; (3) shelter poverty scenarios for essential service workers; (4) analysis of housing assistance programs; and (5) options for improvement of housing affordability for essential service workers.

6.6.1. Market Analysis of "For-Sale" Single Family Homes

Table 9 summarizes the house price data collected for each community, organized by the number of bedrooms and the year built. Table 9 clearly shows that for every bedroom category and irrespective of when the house was built, mean prices in Williston and in Dickinson are higher than Fargo. This can be attributed to the demand and supply mechanisms generated by the oil boom conditions. The house prices in Williston were higher than Dickinson for every category, except for 2 bedroom houses built within the last 5 years. Whether these prices are affordable depends on the incomes of potential buyers.

Table 9. For-sale Housing Analysis by Type of Bedroom

Bedrooms	Age	City	Min	Mean	Median	Max	Mean per square foot
1-2	> 5 years	Dickinson	139,900	198,783	175,000	299,900	$123.24
		Williston	124,500	218,817	182,450	424,500	$125.97
		Fargo	109,900	124,633	125,000	139,000	$127.31
	< 5 years	Dickinson	189,000	254633	259,900	298,000	$139.37
		Williston	234,900	236,600	239,900	244,900	$163.20
		Fargo	189,900	207,450	205,900	225,000	$146.50
3	> 5 years	Dickinson	135,000	215,786	212,500	319,000	$114.17
		Williston	183,000	371,490	350,000	589,000	$147.59
		Fargo	89,550	173,817	159,000	328,400	$121.64
	< 5 years	Dickinson	195,000	279,375	269,950	399,800	$119.54
		Williston	199,500	308,317	291,950	405,000	$182.98
		Fargo	145,000	240,819	260,400	309,900	$141.91
4	> 5 years	Dickinson	164,700	279,844	240,000	470,000	$118.28
		Williston	225,000	362,400	302,000	925,000	$144.44
		Fargo	123,900	257,235	240,000	495,000	$129.85
	< 5 years	Dickinson	271,900	408,938	385,000	429,900	$145.01
		Williston	305,000	451,129	424,900	675,000	$175.06
		Fargo	194,900	242,980	238,900	389,500	$130.49
>4	> 5 years	Dickinson	234,900	361,200	342,450	525,000	$134.48
		Williston	312,500	484,083	399,000	995,000	$142.13
		Fargo	122,367	306,514	313,200	449,900	$137.02
	< 5 years	Dickinson	389,900	487,036	435,000	674,900	$135.93
		Williston	325,000	511,536	464,460	750,000	$166.08
		Fargo	399,900	407,550	382,900	585,000	$161.98

6.6.2. Affordability of Rental Housing for Essential Service Workers

Table 10 summarizes the annual fair market rent values by HUD and annual average market rent values collected from two sources, by bedroom type. Fair market rents indicate the amount of money that a particular property would command, according to HUD estimates (www.hud.gov). In 2005 − before the boom began − the fair market rates in Cass County, where

Fargo is located, were higher than Williams and Stark Counties for all bedroom types. It's important to note that the fair market rents have increased by 2.5-3 times in Williams County and almost 2.0 times in Stark County since the oil boom began. Although the market rents may seem high, similar rent amounts were expressed by participants during the study.

Market rents in Dickinson are lower than Williston for each bedroom type. Comparison of the 2014 market based rent data − presented in table 10 − and the 30% income limits − presented in table 11 − shows that the rents based on market data are by no means affordable to teachers, law enforcement officers, or nurses in both counties. Even the lowest of the two market rents in Dickinson, for a single-occupancy, single bedroom dwelling, represents 48%, 46%, and 40% of the monthly income of school teachers, police officers, and registered nurses at the entry level. Similarly, the lowest of the two market rents in in Williston represents 69%, 68%, and 59% of the monthly income of entry level school teachers, police officers, and nurses. These cost burdens are without the inclusion of the cost of heating and other utilities per month.

Table 12 outlines four scenarios – presented below − that explicates the affordability of rental housing based on shelter poverty (Stone 2006) criteria: once a household has paid housing costs, if the remaining income is not enough to cover the basic non-housing necessities, such households are considered to be in a shelter poor situation. Based on these data it can be concluded that the essential service workers in both counties are facing a rental housing affordability issue. However, essential service workers in Williams County are facing a severe rental housing affordability issue compared to essential service workers in Stark County.

Table 10. Apartment Rental Rates and Fair Market Rents by County for All Bedroom Types

	Rent data		**Bedrooms**				
	type	**County/City**	**Efficiency**	**1**	**2**	**3**	**4**
2014	Fair Market	Williams County	$792	$864	$1,053	$1,311	$1,407
	Rendbits[1]	City of Williston		$2,134	$2,670	$3,461	
	Rentometer[2]	City of Williston	$1,725	$2,020	$2,041	$3,200	$4,180
	Fair Market	Stark County	$599	$626	$742	$1,029	$1,033
	Rendbits	City of Dickinson		$1,681	$2,038	$2,669	
	Rentometer	City of Dickinson	$1,013	$1,380	$1,699	$2,645	$3,038
	Fair Market	Cass County	$437	$529	$684	$1,008	$1,192
2013	Fair Market	Williams County	*$771*	*$841*	*$1,026*	*$1,278*	*$1,371*
	Fair Market	Stark County	*$532*	*$555*	*$658*	*$913*	*$916*
	Fair Market	Cass County	*$408*	*$495*	*$639*	*$942*	*$1,114*
2005	Fair Market	Williams County	$265	$323	$407	$536	$568
	Fair Market	Stark County	$297	$361	$418	$608	$735
	Fair Market	Cass County	$365	$433	$551	$795	$919

[1]Rentbits data was obtained from www.rentbits.com, which offers marketing, tracking, and resident retention tools for thousands of advertisers and millions of renters across the United States.

[2]Rentometer data was obtained from www.rentometer.com, which assists landlords and property managers looking for informative and educational content on important rental housing products. Williston averages were calculated based on 98 rental properties and Dickinson averages were calculated based on 91 rental properties.

Table 11. 2014 Wages and Affordable Income Limits for Non-Metro Western North Dakota

	Wage Category			**30% of Wage Benchmark**		
	Entry	Average	Experienced	Entry	Average	Experienced
Police officers	3001	4154	4730	900	1246	1419
School teachers	2928	3867	4336	878	1160	1301
Nurses	3427	4504	5043	1028	1351	1513
Public administration		3935			1180	

Source: ND Workforce Intelligence

6.6.3. Shelter Poverty Scenarios for Essential Service Workers

Table 12 outlines four scenarios generated to analyze the affordability of both rental and single family housing for essential service workers in the Far West North Dakota Non-Metro Area. According to the Bureau of Labor Statistics, this area includes Stark and Williams and nine adjacent counties (www.bls.gov). These scenarios represent modest living conditions and the minimum costs for these living conditions. Overall, the costs − housing and non-housing − represent a lowest cost scenario, as housing costs don't include payments for heat and other utilities and the non-housing costs don't include obligations for loans, vehicles, or other assets as well as student loans. As a result, the scenarios represent an optimistic case and the actual monthly costs might be higher.

Scenario A presents the housing affordability situation for an entry level teacher, police officer, nurse, and a public administration employee. According to this scenario a single teacher living in a rented apartment is in a shelter poverty situation. In addition, a single teacher and a single police officer living in a single bedroom house on a 15 year fixed rate mortgage (FRM) is in a shelter poverty situation. If the monthly housing costs increase by 3.1% a police officer living in a rented single bedroom apartment would be in a shelter poverty situation. Even for a registered nurse, monthly housing costs under a 30 year FRM represents 35% of the monthly income.

Scenario B presents the context of a teacher, police officer, nurse, and a public administration employee with one child. Based on the average wages, a teacher and a public administration employee with a child is in a shelter poverty situation, under all three housing options. A police officer with a child is close to shelter poverty. But if the monthly costs in general increase by 17%, a police officer would be in a shelter poverty situation under all three

housing options. It's important to note that comparison of 30% income limits- as shown in table 11- of entry level workers, to housing costs in scenario A and B, indicate that none of the housing options meet the 30% affordability criteria. Of course single parent families throughout the U.S. are much more likely to be financially stressed than two-parent families (DeNavas-Walt and Proctor, 2014).

Although not shown in the scenarios, analysis shows that if both parents are working in essential services and has only one child they would not face any significant housing affordability issue. Situation is similar for a family where both parents are working in essential services and has two children and are living in a three bedroom house, which is shown under scenario C. Scenario D presents the housing affordability situation for a family where both parents are working in essential services and has three children and are living in a four bedroom house. Analysis shows that a similar family of five living in a three bedroom house might not experience a housing affordability issue. But they might face other housing issues such as congested living conditions (Stone 2006). Scenario D shows that essential service households with a teacher, a public administration employee, or a police officer face housing affordability issues especially in the rented and 15 year FRM situations.

Table 12. Shelter Poverty (Residual Income) Scenarios for Selected Job Categories in the ND Far West Non-metro Area

			Owned Housing		Non-	Deficit/Surplus			Shelter Poor:		
	Income[1]	Rental Housing[2]	30 Year FRM[3]	15 Year FRM[4]	Housing Costs[5]	Rental Housing	30 year FRM	15 year FRM	Rental Housing	30 Year FRM	15 Year FRM
Scenario A Single Person Household											
Teacher[6]	2928	1380	1188	1605	1578	-30	162	-255	Yes	No	Yes
Police Officer[7]	3001	1380	1188	1605	1578	43	235	-182	No	No	Yes
Nurse[8]	3427	1380	1188	1605	1578	469	661	244	No	No	No
Public Administration Employee[9]	3935	1380	1188	1605	1578	977	1169	752	No	No	No
Scenario B Single Parent Household											
Teacher	3867	1380	1188	1605	2762	-275	-83	-500	Yes	Yes	Yes
Police Officer	4153	1380	1188	1605	2762	11	203	-214	No	No	Yes
Nurse	4504	1380	1188	1605	2762	362	554	137	No	No	No
Public Administrators	3935	1380	1188	1605	2762	-207	-15	-432	Yes	Yes	Yes
Scenario C Two Parents Two Children											
Two Teachers	7734	2,645	1440	1926	4323	$766	1971	1485	No	No	No
Two Police Officers	8306	2,645	1440	1926	4323	$1,338	2543	2057	No	No	No
Two Nurses	9008	2,645	1440	1926	4323	$2,040	3245	2759	No	No	No
Two Administrators	7870	2,645	1440	1926	4323	$902	2107	1621	No	No	No
A Teacher and a Police Officer	8020	2,645	1440	1926	4323	$1,052	2257	1771	No	No	No
A Teacher and a Nurse	8371	2,645	1440	1926	4323	$1,403	2608	2122	No	No	No
A Police Officer and a Nurse	8657	2,645	1440	1926	4323	$1,689	2894	2408	No	No	No
A Teacher and an Administrator	7802	2,645	1440	1926	4323	$834	2039	1553	No	No	No
A Police Officer and an Administrator	8088	2,645	1440	1926	4323	$1,120	2325	1839	No	No	No
A Nurse and an Administrator	8439	2,645	1440	1926	4323	$1,471	2676	2190	No	No	No

Table 12. Shelter Poverty (Residual Income) Scenarios for Selected Job Categories in the ND Far West Non-metro Area (continued)

			Owned Housing		Non-	Deficit/Surplus			Shelter Poor:		
	Income[1]	Rental Housing[2]	30 Year FRM[3]	15 Year FRM[4]	Housing Costs[5]	Rental Housing	30 year FRM	15 year FRM	Rental Housing	30 Year FRM	15 Year FRM
Scenario D Two Parents Three Children											
Two Teachers	7734	3,038	2108	2819	5273	($577)	353	-358	Yes	No	Yes
Two Police Officers	8306	3,038	2108	2819	5273	($5)	925	214	Yes	No	No
Two Nurses	9008	3,038	2108	2819	5273	$697	1627	916	No	No	No
Two Administrators	7870	3,038	2108	2819	5273	($441)	489	-222	Yes	No	Yes
A Teacher and a Police Officer	8020	3,038	2108	2819	5273	($291)	639	-72	Yes	No	Yes
A Teacher and a Nurse	8371	3,038	2108	2819	5273	$60	990	279	No	No	No
A Police Officer and a Nurse	8657	3,038	2108	2819	5273	$346	1276	565	No	No	No
A Teacher and an Administrator	7802	3,038	2108	2819	5273	($509)	421	-290	Yes	No	Yes
A Police Officer and an Administrator	8088	3,038	2108	2819	5273	($223)	707	-4	Yes	No	Yes
A Nurse and an Administrator	8439	3,038	2108	2819	5273	$128	1058	347	No	No	No

[1] All income details were gathered from ND workforce intelligence database.

[2] Rental housing costs were determined based on the lower of the two market rental rates for appropriate type of housing. [3]30 Year FRM cost was determined based on the lowest monthly mortgage payment for an appropriate type of housing, built within the last 5 years. For example for a single person living in a single bedroom house the 30 year FRM's were (Appendix): Dickinson- $1,313 and Williston- $1,188. Lowest of $1,188 was used in the scenario.

[4] Similar to 30 year FRM.

[5] Non-housing cost data was obtained from Economic Policy Institute (EPI). EPI's Family Budget Costs estimate the expenditure a family needs in order to attain a modest living standard. More information can be found on: http://www.epi.org/resources/budget/

[6] Middle school and preschool teacher wages for the far west non-metro area were confidential and not available. The 2013 average annual wage for an elementary school teacher was $44,140 ($3,679 a month) and $33,810 and $49,300 for entry and experienced levels respectively.

[7] This is the 2013 average salary for a police detective. Comparatively, the 2013 average salary for a police patrol officer (and sheriffs and deputy sheriffs) was $49,420 (4119 a month) with entry and experienced level salaries of $40,020 and $54,120 respectively.

Table 12. Shelter Poverty (Residual Income) Scenarios for Selected Job Categories in the ND Far West Non-metro Area (continued)

[8] The 2013 average wage for a nursing assistant was $30,440 with entry level and experienced level wages of $26,290 and $32,520 respectively.

[9] Since no data was available for a specific county/city employee category the 2014 industry-wise average monthly wage data for public administration ($47,216 a year) in Williams County was used to compute the scenarios. The 2013 average, entry level, and experienced level wages for Tax Examiners and Collectors, and Revenue Agents in the far west non-metro area was $51,660, $45,910, and $54,540 respectively. The 2013 average, entry level, and experienced level wages for civil engineers in the far west non-metro area was $63,150, $50,590, and $69,430 respectively.

From a policy perspective, scenario A and B can be considered the most likely scenarios as most potential essential service workers willing to relocate to the two counties might be young and recent entrants into the workforce. Both scenarios present important policy implications. Even under a lower cost estimate for each housing option, essential service workers such as teachers, police officers, and public administration workers face shelter poverty issues. Employers would have to offer housing assistance in the form of rental assistance or mortgage assistance in order to attract these type of essential service workers and similar sentiments were expressed by school superintendents and city officials interviewed during the study. For example one of the new city officials in Williams County commented that: "part of the arrangement was that the city provided housing at a tremendous discount. Otherwise with the going rent I would have never considered it." HWF (2007) argues that a compensation package that includes housing assistance can be an effective recruitment tool, especially in tight labor markets and where housing costs are high. A housing assistance benefit can influence the job choices of relocating workers, particularly those leaving more affordable communities and facing the challenges of living in a more expensive market (HWF 2007).

Essential service workers' families, in scenarios C and D, might not be willing to relocate to the two counties, unless they are otherwise underemployed or have previous ties to the community. Even for potential workers, provision of housing assistance might be a major consideration in the decision to move. Therefore, the next section analyses the different housing assistance options available for essential service workers.

6.6.4. Analysis of Rental Housing Assistance Programs

HUD program income limits outlined in table 12 indicates that essential service workers such as teachers, law enforcement officers, and public service workers wouldn't qualify for

conventional federal low-income housing assistance programs offered through the North Dakota Housing Finance Agency (NDHFA) such as Section 8 housing choice vouchers, low-income housing tax credits, Section 515 rural rental housing loans, and Section 521 rural rental assistance. Under these programs the tenants generally are required to pay 30% of their adjusted monthly gross income as rent. However, these housing assistance programs are designed for very low or low-income earners, below the earning potential of civil service professionals.

According to the NDFHA (2014), the North Dakota Housing Incentive Fund (2) (HIF 2) was created as a means for developing affordable multi-family housing for essential service workers, main street employees, and fixed-income households. The second phase of the fund HIF 2 was approved from 2013-2015. An HIF assisted unit is outlined as a housing unit that benefits from financial assistance from the HIF. For example, if a 10 unit project has a total cost of $1,000,000 and receives $200,000 in HIF assistance, then 20 percent of the units, or 2 units, are considered to be HIF assisted.

A land use restriction agreement or a deed restriction will be placed on HIF-assisted properties dictating affordability terms as agreed to by the project owner in the HIF loan closing documents. The term of affordability for the HIF-assisted units will be a minimum of 15 years. All HIF-funded rental projects must provide housing to households with very low to moderate income, which ranges from 50% to 140% of area median income (AMI), at initial occupancy and subsequent annual recertification. NDHFA requires all project owners to use the rental rates at or below specified limits for each county as published by NDHFA (NDHFA 2014). During the 2013-15 award period, projects totaling 74 (out of 145 total units) essential service worker units were approved under HIF 2 with a fund commitment of $8.3Mn in Williston, with zero similar projects in Dickinson.

Considering the significant demand to enhance essential services in the context of lack of suitable and affordable housing, the Law Enforcement Housing Pilot Program (LEPP) was initiated by NDHFA in 2013 to create affordable rental housing targeted to law enforcement personnel in oil-and-gas impacted counties. As NDFHA (2014) states, the aim of LEPP is the creation of affordable rental housing in areas experiencing difficulty recruiting and retaining law enforcement officers due to high housing costs and/or housing shortages. All LEPP-funded units must meet the objective of providing housing to households deriving primary income from employment as a law enforcement officer. Rents for all LEPP units must be at or below published county limits. If a household residing in a LEPP unit changes primary employment, to a non-law enforcement job, the unit is no longer under LEPP restrictions, and the rent cap associated with the LEPP program is no longer in effect. In order for the project as a whole to remain in compliance with LEPP tenant eligibility requirements, the project owner must promptly fill an available unit with an eligible law enforcement household (NDHFA 2014). During the 2013-15 award period, projects totaling 6 (out of18 total units) LEPP units were approved under LEPP with a fund commitment of $581,569 in Williston, with 8 similar units (out of 24 total units) in Dickinson with a funding commitment of $744,000.

HIF 2 and LEPP clearly indicate the intention to create affordable rental housing for essential service workers. And the rental units subsidized by these two funds will contribute to enhancing the essential service workforce in the two counties studied. Andrews et al. (2011) contends that home owners tend to be less mobile than private renters, even after taking into account other household characteristics, such as age, income, and marital and employment status. This lower mobility among owner-occupants than renters is likely to be because: 1) owners face higher transaction costs when changing homes; and 2) those who choose stability over mobility

would prefer to own their home. On average, an owner without a mortgage is estimated to be 13% less likely to move every year than a private renter, while a mortgage owner's yearly mobility rate is some 9% lower than that of a renter (Andrews et al. 2011). Therefore, provision of rental assistance or promulgation of affordable rental housing as the only solution, could lead to higher worker turnover, especially when considered in the context of heavy workloads. Such sentiments were expressed by school superintendents and city administrators who were interviewed during the study. For example a hospital administrator commented that:

> "Another huge challenge is the turnover. Seems like you get two and you lose five. You know what I mean. So you never ever get a step ahead. Most of the nurses that have left are moving to another state or within North Dakota just because of cost of living and it's so expensive to buy a house. Housing is the number one problem. That's the biggest challenge we have. If we can build an apartment complex or team up with someone in the community, we would be so much better off. You know … offer affordable price."

Employee turnover increases training and re-recruitment costs and leads to other operational issues. As a result from a policy standpoint it's important to examine affordability of single family homes for essential service personnel. The next section addresses this issue.

6.6.5. Housing Assistance Programs for Single Family Housing

USDA and FHA both provide guaranteed loan programs. USDA section 502 and FHA guaranteed loan programs are designed to serve home buyers who have a steady, low or moderate income, and yet are unable to obtain adequate housing through conventional financing. USDA or the FHA does not make a loan directly to an eligible borrower, but guarantees a loan made by an approved commercial lender, which substantially reduces the risk for lenders, thus encouraging them to make loans to residents who have only modest incomes and little collateral.

For a USDA guaranteed loan, an eligible applicant must have an adequate income (up to 115% of AMI), a decent credit history, and be unable to qualify for conventional mortgage credit.[112]

The maximum loan amount is based on what the homeowner can afford. The 2014 guaranteed loan program income limits, for a family of up to four people, in Stark County is $80,300. For Williams County it is $78,200. These income limits increase with additional family members. Based on the monthly incomes used to develop the housing affordability scenarios, it's clear that entry level essential service workers would be within these income limits when the essential service worker is the family's principle earner. The guaranteed loans will improve access to financing for these families.

USDA Section 502 Homeownership Direct Loan Program is designed to serve rural residents earnings less than 80% of the AMI. The program income limits for both counties are shown in table 12. Based on the wages presented, it's clear that even the entry level school teachers and police officers would meet the income criteria, only if they are the major income earner in a household. For example a household with two entry level teachers would earn an average income of $70,272 and would meet the income limits only if they had seven or more children. As a result the usability of direct loans might be limited for essential service workers and eligibility might vary from one case to another. Even if the applicant is able to meet income criteria the housing must be modest in size, design, and cost. The North Dakota maximum direct home loan limit is set at $240,000.

[112] FHA doesn't have income limits but relies on strict debt-to-income ratios with credit scores of 500 or higher

Table 13. HUD Program Income Limits (Section 8 etc.)

Persons In Family	Stark County Income Limits				Williams County Income Limits			
	2014		2013		2014		2013	
	Very Low[1]	Low[2]	Very Low	Low	Very Low	Low	Very Low	Low
1	24,450	39,100	23,300	37,250	23,700	37,950	22,600	36,150
2	27,950	44,700	26,600	42,600	27,100	43,350	25,800	41,300
3	31,450	50,300	29,950	47,900	30,500	48,750	29,050	46,450
4	34,900	55,850	33,250	53,200	33,850	54,150	32,250	51,600
5	37700	60,350	35,950	57,500	36,600	58,500	34,850	55,750
6	40,500	64,800	38,600	61,750	39,300	62,850	37,450	59,900
7	43,300	69,300	41,250	66,000	42,000	67,150	40,000	64,000
8	46,100	73,750	43,900	70,250	44,700	71,500	42,600	68,150

Source: HUD
[1]Very Low income limit is defined as 50% of area median income limit
[2]Low income limit is defined as 80% of area median income limit

Considering the facts and data presented on the available rental and single family housing programs, it's clear that although essential service workers face affordability issues they do not qualify for conventional housing assistance programs, except for guaranteed loan programs. As a result there is a need to explore options and mechanisms that could be used to provide affordable housing to essential service workers so that Stark and Williams Counties can meet the demands of a rapidly growing population. This study analyzes three options that could be used for provision of housing that is affordable for essential service workers: community land trust model (CLT), property tax exemption model, and low interest model.

6.6.6. Community Land-Trust or Land-Bank Model

A community land trust (CLT), sometimes referred to as a Land Bank, is a nonprofit organization created to hold land for the benefit of the community and of individuals within the community (Peck 1993). Nonprofit organizations, such as those that sponsor CLTs, occupy an important position in efforts to support low-income housing (Bratt and Keyes 1998). The CLT

model is designed primarily to provide perpetually affordable home ownership to low-and moderate income households by giving home owners only a limited equity interest in their homes. Households own the structure but not the land. The initial purchase price of a land trust home generally excludes the cost of the land and may also reflect other subsidies. Since home owners receive only a fraction of the appreciation in the property upon resale, the investment value of the home is less than under full ownership. But housing costs are reduced (Bourassa 2007).

Under a CLT model, ownership of land is separated from ownership of its use or uses. The CLT acquires land for the common use of its membership through a lease arrangement. Use of the land is restricted by the covenants of the CLT. Since the CLT owns the land in perpetuity, there is no land appreciation to pass on to future owners or tenants. The CLT model provides the individual with access to decent and affordable housing that probably would not be available otherwise and that will remain permanently affordable. For homeowners under the CLT, equity may be earned on home improvements, but the equity is configured so that the next purchaser will also meet the income guidelines established by the CLT membership. This provides economic fairness to the seller and perpetual access to low-income purchasers (Peck 1993; Bourassa 2007).

It's possible to devise a public-private-nonprofit partnership model under a CLT approach. The board governing the trust can be designed to facilitate such a partnership. The public sector may participate in the provision of infrastructure, assistance on land acquisition, policy formulation and supportive financing (Gallent 2009). The private sector may participate in construction of the properties, mortgage financing, and management. Such a partnership might be able to utilize HUD opportunities such as Community Development Block Grants (CDBG) or

HOME Investments Partnership Program (or other similar programs) under such an arrangement. It's also possible to combine FHA or USDA insured loans under a CLT model so that the down payment burdens are less for the home buyers.

There is no strong history of CLT's in North Dakota. The only CLT project in the state is located in Grand Forks, which is located in the eastern part of the state. Established in 2010, so far the CLT has constructed four homes and plans to construct two more in the near future. The Grand Forks CLT can be used as a base model for establishment of CLTs in Williams and Stark Counties for the provision of housing that is affordable to essential service workers.

Table 14 estimates the monthly housing costs for a single family home under a CLT model. The down payment and the interest rates were maintained the same for comparison purposes. Analysis was carried out using the average price only for homes built within the last five years. The monthly housing costs under 15 year FRM for a CLT model are 32%, 29%, 20%, and 17% lower for 1-2 bedroom, 3 bedroom, 4 bedroom, and 5+ bedroom houses in Stark County, compared to a conventional housing model. The monthly housing costs under 15 year FRM for a CLT model are 33% , 26%, 18%, and 16% lower for 1-2 bedroom, 3 bedroom, 4 bedroom, and 5+ bedroom houses in Williams County compared to a conventional housing model. The monthly housing costs under a 30 year FRM shows similar cost reductions for each bedroom type in both the counties. If the monthly housing costs of the CLT model are used in the shelter poverty scenarios, no essential worker under any scenario, even a single teacher with a child, is in a shelter poverty situation. This fundamental cost analysis shows that the CLT model holds great potential for provision of single family housing that is affordable to essential service workers in the two counties.

These reductions are based on the costs of a developed land of $80,000, suitable for building a single family home. For example, one of the single family home builders in Williams County commented that:

> "Per lot your hard cost in that is going to be $50,000 to $60,000 just the development side of things and raw land may cost about $20,000 a lot. So without making any profit you got to have about $80,000 to $90,000 build into your lot. The raw land cost about $25,000 an acre is probably the average price. In the county the lots have to be minimum one acre."

The cost of a developed lot for a single family home ranged from $65,000- $95,000 based on the interviews with home builders and real estate developers. As a result if the land cost is considered at $65,000, the costs reductions from the CLT model under a 15 year FRM are 26% , 23%, 16%, and 14% lower for 1-2 bedroom, 3 bedroom, 4 bedroom, and 5+ bedroom houses in Stark County. Similar costs savings are 27% , 21%, 14%, and 13% for 1-2 bedroom, 3 bedroom, 4 bedroom, and 5+ bedroom houses in Williams County. These cost reductions are still significant for improving home affordability.

The cost reductions of the CLT model presented in this analysis are based on the exclusion of land value from the mortgage costs, property tax and insurance based only on the house. In an actual CLT model the cost reductions could be greater if different financial assistance mechanisms available for non-profits such as a CLT are utilized in the construction of housing, which eventually lowers the price of houses. CLT's could utilize financial assistance such as the USDA Rural Housing Site Loan Program (Sections 523 and 524), Section 502 Rural Housing (RH) loans, Sections 235 and 236 insured mortgages. CLT's in the two counties may also benefit from property tax exemptions. Under state law, property owned by a non-profit for

affordable housing can be exempt from property taxes. Also housing costs can be reduced by eliminating the one acre lot requirement. But small lots could reduce long term property appreciation.

Table 14. Community Land Trust Model Analysis

	20% down	Principle &Interest[1]	Property Tax[2]	Home Insurance[3]	Total monthly payment
15 Year FRM, 20% down, 3.285% , Built< 5 years					
1-2 Bedrooms					
Dickinson	$34,926	$984	$148	$72	$1204
Williston	$31,980	$901	$104	$66	$1071
3 Bedrooms					
Dickinson	$39,875	$1,123	169	$83	$1375
Williston	$45,663	$1,286	$148	$95	$1529
4 Bedrooms					
Dickinson	$65,787	$1,853	$278	$136	$2267
Williston	$74,225	$2,091	$240	$154	$2485
30 Year FRM,2 0% down, 4.165%, Built< 5 years					
1-2 Bedrooms					
Dickinson	$34,926	$680	$148	$72	$900
Williston	$31,980	$622	$104	$66	$792
3 Bedrooms					
Dickinson	$39,875	$776	$169	$83	$1028
Williston	$45,663	$889	$148	$95	$1132
4 Bedrooms					
Dickinson	$65,787	$1,281	$278	$136	$1695
Williston	$74,225	$1,445	$240	$154	$1839

[1]Principle and Interest was calculated on the value of the house without the land
[2]Was calculated using the same formula but only on the home value
[3]Insurance was calculated only on the home value

Bourassa (2007) contends that owning CLT houses is preferable to renting from a household's point of view when interest rates are low. The CLT model offers a supportive environment for new home owners and it helps households become financially independent.

Owners do receive the appreciation in the value of their structure. However, the success of the CLT model depends on the support of the local and state government (Bourassa 2007). If the CLT homes are intended for essential service workers, the local government has incentive to support such initiatives.

Temkin et al. (2013) argue that shared equity initiatives, such as CLTs, provide homeownership opportunities to low and moderate income families who buy homes at below-market prices. Based on outcomes for seven shared equity programs, they present an analysis which homebuyers earned returns that were competitive with what they would have received if they had invested in stocks or bonds. In addition, homes remained affordable to lower income buyers over time as the homes were resold. Homeownership under these programs was sustainable. There were very low delinquency and foreclosure rates and many families who sold their homes were able to use their sales' proceeds to purchase market-rate homes. Owners also showed little evidence of being locked in place, and moved to new homes at rates near the national average (Temkin et al. 2013).

In addition to the financial implications, the establishment of CLTs in Williams and Stark counties require clarification of three specific issues: the resale formula, the governing structure, and continued local government support. The governance structure of the CLT affects the direction of the CLT. If a CLT is reliant on community volunteers, the long-term governance and sustainability of the trust may be negatively impacted. It may be feared that the localism agenda will turn out to be a 'survival of the fittest.' Given the connection to locally-specific housing allocations, mechanisms will need to be in place to ensure that the CLTs themselves are subject to wholly transparent and inclusive decision-making processes. In addition, space has not permitted a full discussion of the funding aspects of CLTs, but in an era of stringent funding cuts

it is likely that CLTs will face a fight to get their 'fair share' of resources, including land and finance (Moore and McKee 2012).

6.6.7. Property Tax Exemption Model

Exemption of property taxes is not a novel practice. Generally exemptions are granted to promote businesses such as in the case of new or expanding business or to meet special purposes. For instance a new firm that is certified as a primary sector business by the ND Department of Commerce Division of Economic Development and Finance may be granted a property tax exemption for up to five years. An exemption of property taxes would reduce the monthly housing costs by 13% for all bedroom types in Stark County and 10% for all bedroom types in Williams County under a 15 year FRM. For a 30 year mortgage cost reduction would be 17% for all bedroom types in Stark County and 13% for all bedroom types in Williams County. Although the cost reductions are not significant compared to the CLT model, incorporating the new monthly housing costs in the affordability scenarios shows that property tax exemption would change the shelter poverty situation in many scenarios.

Property tax exemption doesn't change any of the shelter poverty situations under scenario A (single person household). Under scenario B (one parent one child) a teacher or a public administration employee under a 30 year FRM would no longer be in a shelter poverty situation. Under scenario D all the essential service workers who were in a shelter poverty situation under a 15 year FRM would no longer be in a shelter poverty situation with a property tax exemption, except for a household with two teachers, who will be still in a marginal shelter poverty situation. As a result, a property tax exemption model would be useful in some situations. Compared to a CLT model, a property tax exemption model is easy to design as the income levels or occupational categories that would be granted a property tax exemption can be

easily defined. It's also easy to discontinue if there is no further need, compared to a CLT model.

6.6.8. Low Interest/Down Payment Model

State of New Jersey offers a low interest loan for police officers and fire fighters called the *Police & Firefighter's Retirement System Mortgage Loan Program.* Using this program as a guideline a similar program can be designed at the state level for essential service workers. A low interest (10 year T-Bills plus 1.0%, which approximates to about 0.6% - 1.0% below the market rate) 30 year FRM will result in a roughly 5.5% reduction of monthly housing costs in both counties for all bedroom types. Incorporation of these reduced housing costs, under a 30 year FRM, in the affordability scenarios indicate that teachers and public administration employees (scenario B- one parent one child), who were in a shelter poverty situation are no longer in a shelter poverty situation. Therefore, a low interest model would definitely be useful to improve the homeownership situation of essential service workers.

However, based on the housing prices summarized in appendix A it's clear that essential service workers at the entry level or single parent workers would have trouble affording a down payment of 20% of purchase price. Loans with down payments less than 20% require mortgage insurance, which increases monthly housing costs. For example, for an FHA guaranteed loan the upfront mortgage insurance premium would be- considering a 3.5% minimum down payment- $4,712 and roughly $190 in monthly mortgage insurance for a 3 bedroom house in Stark County. USDA section 502 loans are the only loans that offer a zero down payment option. Under a 502 loan the upfront mortgage insurance fee would be $5,587 and the monthly mortgage insurance fee would be roughly $120 for a 3 bedroom house in Stark County. Even if essential service workers qualify for a FHA or USDA guaranteed loan, a lower down payment would transpire

into a higher monthly payment. The affordability scenarios show that even with a 20% down payment, the monthly housing costs are not affordable to essential service workers in multiple contexts. As a result a higher monthly payment, of principle and interest, based on a lower down payment, which also includes monthly mortgage insurance costs wouldn't improve the housing affordability context of many essential service workers who are experiencing affordability issues, especially under Scenario A and B. Therefore, it's clear that for a low interest rate mortgage to be practical, in the context of the two study counties, essential service workers might also require down payment assistance.

Similar programs that offer low cost loans and down payment assistance are available that could be used as a guideline in designing a state level program for essential service workers in North Dakota. The Mississippi Housing Assistance for Teachers Program (HAT) offers down payment and closing cost assistance to teachers. Other state level programs such as the *New Jersey Police & Firefighter's Retirement System Mortgage Loan Program***,** *Texas State Affordable Housing Corporation, CalPATH of California,* to name a few, offer low interest rate loans and down payment assistance to essential service workers. In addition programs such as HUD Good Neighbor Next Door (GNND) program offers HUD-owned properties in designated areas at a 50% discount to teachers, firefighters, and police officers**.** GNND is also not available in North Dakota.

6.7. Conclusion

Most studies on housing focuses on urban settings and/or low income earners. Comparatively, this study focuses on two rural counties and middle-income earners of those communities. This study examines the dynamics of a rural housing market during a time of rapid economic and population growth. During a boom period, like that experienced in western North

Dakota after 2005, housing demand increases greatly due to expanded employment opportunities. Also during a boom, the supply of housing is constrained because the construction workers, equipment, and materials are otherwise fully employed. Many rural counties in states such as Pennsylvania, Oklahoma, and Montana etc. are currently experiencing rapid oil and gas development. As a result this study will provide a lens or a foundational understanding of housing challenges and barriers that rural communities experience during an economic growth phase triggered by oil and gas activity.

Most of the increased demand for temporary and permanent housing in the North Dakota oil boom communities comes from permanent and temporary oil industry workers. This paper focuses on the housing stress faced by civil servants such as, teachers, law enforcement personnel, and public administrators. Rapidly expanding communities that want to maintain sustainable growth need to recruit these professionals to provide essential services, but their salaries cannot compete with the salaries and housing bonuses of oil industry professionals.

The findings of this study clearly indicate that many essential service workers face housing affordability issues during a period of rapid energy development. The cost of rental housing in the case study counties has increased greatly during the oil boom. Some local government units have resorted to use of emergency housing, such as FEMA trailers to help recruit essential civil servants, such as teachers. And the State of North Dakota has developed housing assistance policies to support rental housing units. This paper has demonstrated that newly hired single teachers are in danger of shelter poverty, whereas single law enforcement officers, nurses, and administrators, are able to afford rental housing without reducing themselves to shelter poverty, especially as new multiunit housing is constructed. Most newly

hired essential government workers who are single parents would find themselves in shelter poverty in these communities.

But owner occupied housing is favorable for stable communities with stable civil service work forces. The findings of this analysis show that conventional housing assistance programs, except for FHA/USDA guaranteed loans, are of little use to solving the affordability issues of essential service workers in the two counties. As a result new innovative housing and financing solutions are necessary to address the affordability issues of essential service workers. Out of the three models presented and discussed, the CLT model has considerable financial potential towards provision of housing that is affordable to essential service workers. But property tax exemption and low-interest/down payment loans would also improve the affordability of home ownership for essential service workers in these communities.

6.8. References

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APPENDIX. ADDITIONAL MATERIAL

Table A1. Single Family Housing Cost Analysis

1-2 Bedrooms						3 Bedrooms					
15 Year FRM	20% down	P & I	Property Tax	Home Insurance	Total monthly payment	15 Year FRM	20% down	P & I	Property Tax	Home Insurance	Total monthly payment
Rate	3.285%					Rate	3.285%				
Built> 5 years						Built> 5 years					
Dickinson	$39,756	$1,120	$168	$82	1370	Dickinson	$43,157	$1,215	$183	$90	1488
Williston	$43,763	$1,233	$142	$91	1466	Williston	$74,298	$2,093	$239	$154	2486
Built< 5 years						Built< 5 years					
Dickinson	$50,926	$1,434	$215	$106	1755	Dickinson	$55,875	$1,574	$236	$116	1926
Williston	$47,980	$1,351	$54	$100	1605	Williston	$61,663	$1,737	$199	$128	2064

4 Bedrooms						5 or more Bedrooms					
15 Year FRM	20% down	P & I	Property Tax	Home Insurance	Total monthly payment	15 Year FRM	20% down	P & I	Property Tax	Home Insurance	Total monthly payment
Rate	3.285%					Rate	3.285%				
Built> 5 years						Built> 5 years					
Dickinson	$55,968	$1,576	$236	$116	1928	Dickinson	$72,240	$2,035	$305	$150	2490
Williston	$72,480	$2,042	$233	$150	2425	Williston	$96,816	$2,727	$313	$201	3241
Built< 5 years						Built< 5 years					
Dickinson	$81,787	$2,304	$345	$170	2819	Dickinson	$97,407	$2,744	$411	$202	3357
Williston	$90,225	$2,542	$291	$187	3020	Williston	$102,307	$2,882	$330	$212	3424

Table A1. Single Family Housing Cost Analysis (continued)

1-2 Bedrooms							3 Bedrooms						
30 Year FRM	20% down	P & I	Property Tax	Home Insurance	Total monthly payment		30 Year FRM	20% down	P & I	Property Tax	Home Insurance	Total monthly payment	
Rate	4.165%						Rate	4.165%					
Built> 5 years							Built> 5 years						
Dickinson	$39,756	$774	$168	$82	1024		Dickinson	$43,157	$840	$183	$90	1113	
Williston	$43,763	$852	$142	$91	1085		Williston	$74,298	$1,447	$239	$154	1840	
Built< 5 years							Built< 5 years						
Dickinson	$50,926	$992	$215	$106	1313		Dickinson	$55,875	$1,088	$236	$116	1440	
Williston	$47,980	$934	$154	$100	1188		Williston	$61,663	$1,201	$199	$128	1528	
4 Bedrooms							5 or more Bedrooms						
30 Year FRM	20% down	P & I	Property Tax	Home Insurance	Total monthly payment		30 Year FRM	20% down	Principle and Interest	Property Tax	Home Insurance	Total monthly payment	
Rate	3.285%						Rate	3.285%					
Built> 5 years							Built> 5 years						
Dickinson	$55,968	$1,090	$236	$116	1442		Dickinson	$72,240	$1,407	$305	$150	1862	
Williston	$72,480	$1,411	$233	$150	1794		Williston	$96,816	$1,885	$313	$201	2400	
Built< 5 years							Built< 5 years						
Dickinson	$81,787	$1,593	$345	$170	2108		Dickinson	$97,407	$1,897	$411	$202	2510	
Williston	$90,225	$1,757	$291	$187	2235		Williston	$102,307	$1,992	$330	$212	2534	

Table A2. Approximate Cost of CLT Model Housing

	1-2 Bedrooms	
	Dickinson	Williston
Average Price		
Built< 5 years	$254,633	$239,900
Price without land	$174,633	$159,900
	3 Bedrooms	
Built< 5 years	$279,375	$308,317
Price without land	$199,375	$228,317
	4 Bedrooms	
Built< 5 years	$408,938	$451,129
Price without land	$328,938	$371,129
	5 or more Bedrooms	
Built< 5 years	$487,036	$511,536
Price without land	$407,036	$431,536