A Case Study of Regional Economic Resilience of a Canadian Resource-Based Community

By:

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A thesis submitted in partial fulfillment of the requirements for the degree of

Master of Arts

in

Human Geography

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Abstract

This research examines the regional economic resilience of resource-based communities (RBCs) in a Canadian context. The Town of Devon in the province of Alberta, Canada is a case study for this project. The objectives of this study are 1) To develop a conceptual analytic framework to evaluate regional economic resilience of a resource-based community; 2) To assess economic, social, environmental, and infrastructural forms of resilience *and* the role of governance from publicly available archived quantitative and qualitative data based on the developed analytic framework; and 3) To identify priority development areas of municipal and regional policy documents through content analysis and assess the role of governance in directing the regional economic resilience of Devon.

The research utilizes secondary quantitative and qualitative data and thematic content analysis of regional and municipal policy documents. Secondary data was collected through federal and regional data depositories and informal discussions with the municipality. The research is instrumental in nature and can be used to highlight processes to increase a resource-based community's resilience. The findings are discussed based on the developed analytic framework of regional economic resilience, and the themes emerged from content analysis of policy documents.

Three key findings can be drawn from this research. The first is that resilience of a resource-based community is achievable. The second is that Devon has typical social, economic and environmental characteristics of an RBC but has experienced a shift towards resilience in social and environmental domains. The shift is owed to municipal initiatives and policy orientation focused on community facility development and environmental resilience. The third finding is related to Devon's attempts to take advantage of its geographical location and regional setting to

increase the economic diversification and long-term resilience. The challenges of achieving resilience in an RBC like Devon is that several factors of regional economic resilience are beyond the local government's jurisdiction and there is the absence of comprehensive approach to addressing this issue.

Preface

This thesis is an original research work by Nushrat Jahan. The research project which this thesis is a part, received funding from a Mitacs Accelerate research project fund, titled as “Community Economic Profile Analytic Framework”.

Acknowledgement

I want to express my gratitude to all the people who have helped me to do this research. First of all, I want to thank my supervisor Dr. Leith Deacon for his constant support, guidance, and constructive feedbacks throughout the research process. I want to thank you for taking the time to understand my research motivations and help me to understand the research problem and framing it in the Canadian context.

I want to thank my committee members, Dr. Amrita Singh, supervisory committee member, Dr. Brenda Parlee, examination committee member, and Dr. Theresa Garvin, who served as the committee chair. I want to thank you for your constructive questions and feedbacks that contributed to making the thesis defense a positive experience. I would like to acknowledge Dr. Deacon and Dr. Garvin for inspiring me with their ability to teach Human Geography and Environmental Planning that helped me to perform as a teaching assistant to the best of my ability. I am grateful to all the faculty members and fellow graduate students of the Human Geography and the Planning program, for their supportive advice and insightful discussions have been crucial for my learning in this program.

I want to thank my family for their love and support that gave me the confidence to pursue this study. I want to thank my husband Zayed, for his patience and support during my research. Finally, I would like to thank the municipal officials and the council of Town of Devon for providing me the access to the relevant data and resources for conducting this research. I also want to express my gratitude to Mitacs and Tessellate Inc. for providing the necessary funds for this study.

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Acronyms

CRB – Capital Region Board

FIFO – Fly in Fly out

IDP- Inter-Municipal Development Plan

MDP- Municipal Development Plan

MMT – Multimodal Transportation

RBC – Resource-based community

Chapter 1: Introduction

1.1 Background

As the world has moved well into the second decade of the 21st century, concern over ensuring sustainable social and economic development in the face of global environmental change has become more pronounced (Kriegler et al., 2016; O'Neill et al., 2015; Rodrik, 2014). Despite concerted efforts to develop alternative energy sources, fossil fuels continue to be the primary source of energy around the world (Höök & Tang, 2013). While fossil fuel extraction and burning are at the core of today's developmental discussions (Hansen & Sato, 2016; Höök & Tang, 2013; Rosen & Dincer, 2001), the world will continue to be dependent on fossil fuel unless alternative sources of energy become more accessible and affordable.

The world's urban population now account for over 50% of the total people on earth and this urbanization is expected to continue (World Health Organization, 2016). As a result of fossil fuel usage and global urbanization, resource-based communities (RBCs) in and around known sources of fossil fuel deposits, will continue to exist and grow (McDonald, 2008). In the past, resource-based communities developed as company towns where the provision of housing for the workforce was the primary and sometimes sole purpose (Halseth & Sullivan, 2004). Historically, there was less focus on the long-term resilience of RBCs, and many towns were abandoned once the resource deposit was depleted or the associated industry faced a downturn (Halseth & Sullivan, 2004). Current RBCs are not simply responsible for housing the workforce; they are concerned about resident population retention, economic growth, and long-term sustainability and resilience (Keough, 2015). These concerns align with a shifting global focus on sustainable urban development, led by the United Nations' Sustainable Development Goals (SDG) set out in 2014 (Table 1.1). Goal eleven of the SDG focuses on making cities safe,

inclusive, resilient and sustainable (United Nations, 2016) . Also, in goal 7 of the SDG, ensuring access to affordable, sustainable, and modern energy is the focus while in goal 8, the promotion of sustainable economic growth and complete employment for all is at the core. Building sustainable infrastructure for all and promoting sustainable industrialization and innovation is the target of goal nine (United Nations, 2016).

Table 1.1: UN Sustainable Development Goals (SDG)

Goals	Target
Goal 1	End poverty everywhere, in all its forms
Goal 2	End hunger, achieve food security and improved nutrition and promote sustainable agriculture
Goal 3	Ensure health lives and promote well-being for all at all ages
Goal 4	Ensure equitable and quality education and promote lifelong learning opportunities for all
Goal 5	Achieve gender equality and empower all women and girls
Goal 6	Ensure availability and management of water and sanitation for all
Goal 7	Ensuring access to affordable, sustainable and modern energy
Goal 8	Promoting sustainable economic growth and full employment for all
Goal 9	Building sustainable infrastructures for all and promoting sustainable industrialization and innovation
Goal 10	Reduce inequality within and among countries
Goal 11	Making cities safe, inclusive, resilient and sustainable
Goal 12	Ensure sustainable consumption and production patterns
Goal 13	Take urgent action to combat climate change and its impacts
Goal 14	Conserve and sustainably use the oceans, seas and marine resources for sustainable development
Goal 15	Protect, restore and promote sustainable use of terrestrial ecosystems, forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss
Goal 16	Promote peaceful and inclusive societies, provide access to justice for all and build effective, accountable and inclusive institutions at all levels
Goal 17	Strengthen the ways of implementation and revitalize the global partnership for sustainable development

Source: Adapted from (United Nations, 2016)

Developing resilient and sustainable resource-based communities has begun to gain attention in social science circles (Graziano & Rizzi, 2016; Halseth & Sullivan, 2004; Keough, 2015; Lawrie, Tonts, & Plummer, 2011; McKenzie & Rowley, 2013; Perry & Rowe, 2015; Petrova & Marinova, 2013; Zarsky & Stanley, 2013). Resource-based communities can be characterized by

unique social and economic features and urbanization trends such as rapid population growth, single industry dependence, and intense developmental pressure on urban services (Watkins, 1963; Innis, 1936, 1995; Lawrie, Tonts, & Plummer, 2011; Auty, 2001). These communities may contribute significantly to a country's economy but face recurrent economic boom and bust cycles (Watkins, 1963; Innis, 1936, 1995). Much of the academic discussion on sustainability and resilience of resource-based communities focus on environmental protection; many researchers are now looking into the socio-economic impacts of resource extraction (Keough, 2015; Lawrie, Tonts, & Plummer, 2011; Halseth, 1999).

1.2 Justification of the research

Resource-based communities are an important part of the economic landscape of Canada (Deacon & Lamanes, 2015) and contribute significantly to both the gross domestic product and employment sector. For example, within the natural resources sector, energy accounted for 10% of the total nominal GDP and 300,000 jobs in 2014 (Natural Resources Canada, 2016) (Figure 1.1, 1.2). Estimated at 315 billion barrels, Canada has the third largest oil reserve in the world, the vast majority of which is found in the Province of Alberta in the Athabasca Oil Sands(Alberta Energy, 2016) (Figure 1.3).

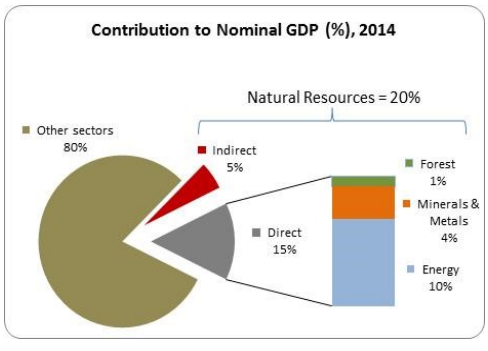

Figure 1.1: Contribution of the Canadian Natural Resources sector to nominal GDP

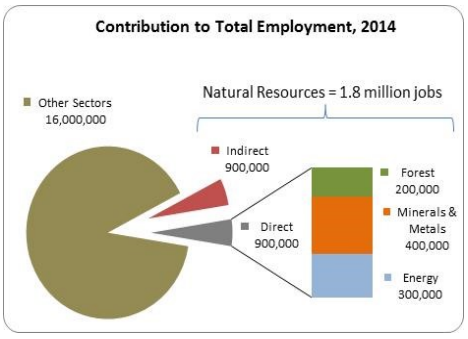

Figure 1.2: Contribution of the Canadian Natural Resources sector to total employment
Source: Natural Resources Canada, 2015

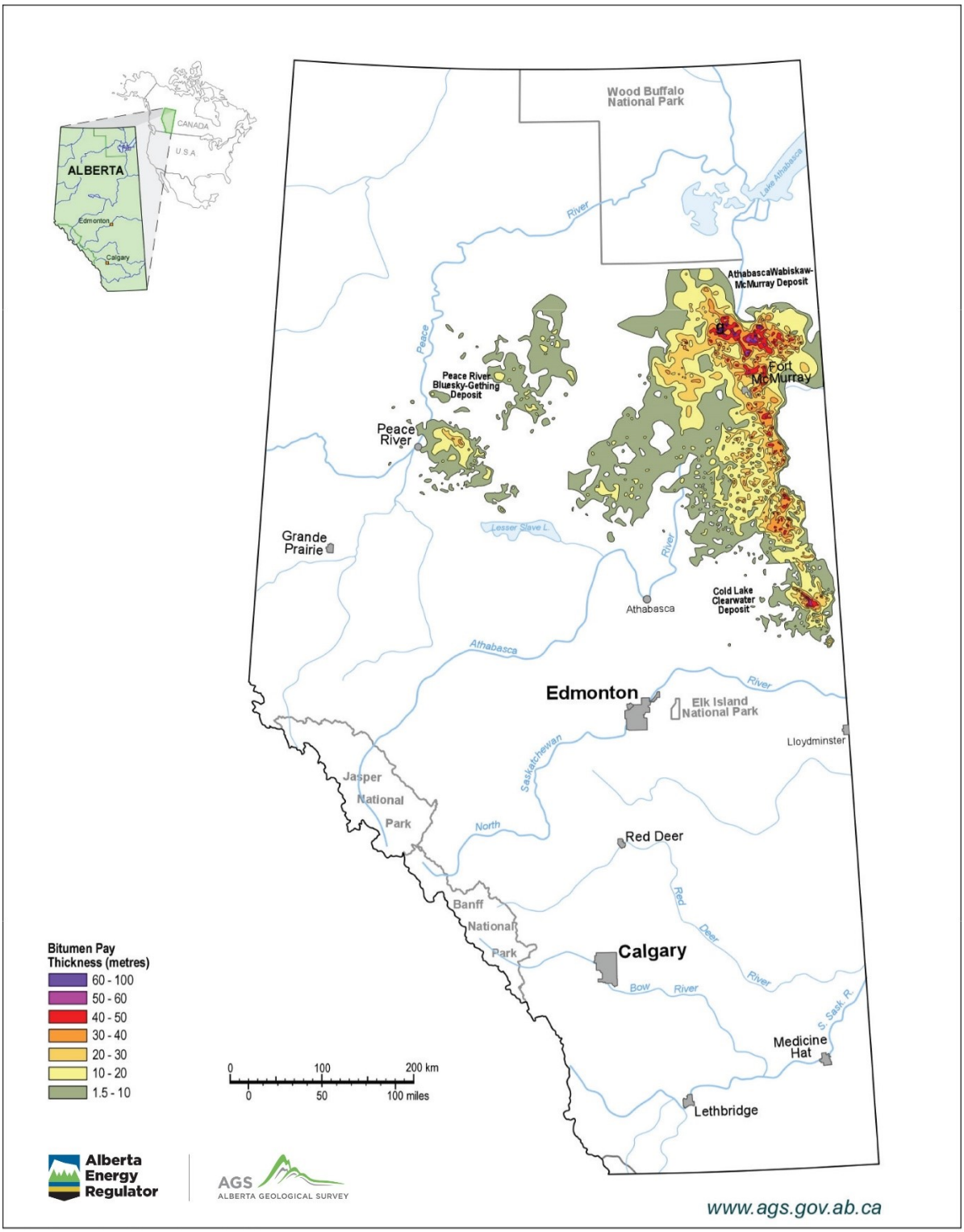

Figure 1.3: Map of oil sands deposit in Alberta, Canada
(source: Alberta Energy Regulator)

The Province of Alberta has witnessed high economic and population growth since the oil boom of the 1970s (Emery & Kneebone, 2013). The population of Alberta in 1975 was 1,576, 549 and in 2015 it is estimated to be 4,049,407 (Alberta Municipal Affairs, 2016). Therefore, according to these statistics, the population of Alberta grew at a 3.92% per annum rate in the last 4 decades. Economic cycles of boom/bust have been a familiar pattern of the Albertan economy since the 1970s too (Emery & Kneebone, 2013). The economic boom of the 1970s was followed by a bust in the early 1980s which lasted for over 10 years. As a result, there had been expenditure cuts on social services and health services at the national and provincial level for several years since the mid-1980s to mid-1990s (Soucy & Wrobel, 2000). From 1997 to 2009 the province of Alberta experienced tremendous growth in oil and gas sector only to enter a period of economic recession which continues throughout 2016.

Alberta's economy is dependent on the energy sector as oil, gas, and mining sectors contributed 18.3% of Alberta's GDP in 2015 (Alberta Economic Development and Trade, 2016). There is also indirect reliance of the economy on this sector through linkage industries like transportation, services, and business services sectors. The lack of diversification in economic sectors has been criticized as a contributing factor in the economic busts in the past and the ongoing economic downturn period (Dahlby, Macaspac, & McMillan, 2013). However, the provincial government and related arms-length agencies such as The Capital Region Board of Alberta have indicated that the Albertan economy will be dependent on the oil and gas sector in the foreseeable future (The Capital Region Board, 2009; Alberta Economic Development and Trade, 2016). Thus, communities across Alberta are not likely to experience any significant change in their economic sectors for the foreseeable future. Often, small towns are more seriously impacted during bust periods since they do not have a diversified economic base found in larger cities (Robertson &

Blackwell, 2014). A lack of economic diversification is a critical issue for recurring economic cycles experienced in Alberta, but rarely has it been examined that whether the resource-based communities in this province have the capacity to diversify in its social, economic, environmental, and infrastructure sectors. However, studies show that diversification of economic sectors alone cannot guarantee resilience to economic cycles (Dahlby et al., 2013). For example, the Province of Ontario has a more diversified economy than Alberta, yet there is no statistically significant evidence of Ontario's better performance in terms of employment and net income during recessions (Dahlby et al., 2013).

The population growth and labor force supply follow a cycle similar to the economic boom and bust in RBCs. In an RBC , short-term challenges faced by the municipalities include the provision of utilities and services for a rapidly growing population during the boom period and long-term challenges center on attracting and retaining population and businesses during a bust (Keough, 2015). The long-term challenge for municipalities is to gradually develop physical and economic infrastructures to channel the benefits of resource extraction sector towards social and economic resilience and development. The Town of Devon, a resource-based community in the province of Alberta, is well suited as a case study to examine the various process of socio-economic resilience taking place amid the recursive circle of economic boom and bust. This requires an in-depth study of the resource-based community's current social, economic, and environmental scenarios and governance strategies that can guide their future resilience to economic boom and bust cycles.

This thesis is framed around goal eleven of the United Nations Sustainable Development Goals to make cities resilient and sustainable (United Nations, 2016). Previous studies on regional economic resilience have focused on economic characteristics (Foster, 2007; Graziano & Rizzi,

2016; Martin, 2012; Simmie & Martin, 2010) as well as social features (Graziano & Rizzi, 2016; Osth, Reggiani, & Galiazzo, 2015), the state of environmental awareness, and protection initiatives (Cutter et al., 2008; Graziano & Rizzi, 2016), physical infrastructures (Eraydin, 2016), policy orientation towards economic growth (Eraydin, 2016; Eraydın, 2013), and sustainable development in communities (Graziano & Rizzi, 2016; Osth et al., 2015). These studies indicate that economic growth influences and in exchange is dependent on social, environmental and governance domains of development and thus sets the community's future on a sustainable development path.

The aim of this thesis is to develop a conceptual, analytic framework of regional economic resilience based on existing literature on economic resilience and apply it to a resource-based community in the province of Alberta. This study considers the role of economic indicators, social development indicators, environmental protection and physical infrastructure levels on the economic resilience. It also looks into, how all these factors are influenced by policy decision making at the different level of government and in turn influence it back.

1.3 Research questions and Objectives

This thesis will use The Town of Devon as a case study to answer the following questions

1. What role do the economic, social, environmental, infrastructural, and governance factors have in making a resource-based community in Canada more or less resilient?
2. How do government policies influence resilience in economic, social, environmental, and infrastructural domains within a Canadian resource based community?

These research questions will be answered by the two following objectives

1. To develop a conceptual analytic framework to evaluate regional economic resilience of a resource-based community
2. To assess economic, social, environmental, and infrastructural forms of resilience and role of governance from publicly available archived quantitative and qualitative data based on the developed analytic framework
3. To identify priority development areas of municipal and regional policy documents through content analysis and assess the role of governance in directing the regional economic resilience of Devon

1.4 Contribution of the research

There are several potential contributions of this research. First, this study will shed light on how social, economic, and governance issues of resource-based communities evolve in a cyclical boom and bust economy. There have been several studies of regional economic resilience. However few specifically examine resource-based communities. Second, this project will bridge the gap between research examining regional economic resilience and socio-economic impact of resource-based development. Third, this study aims to examine the socio-economic and governance process that takes place in a resource-based community and explores its resilience based on the trend in those processes and can inform how communities in a resource-based region perform in a cyclical economy of boom and bust over the years and how those evolve to become resilient or not resilient. Fourth, this study will contribute to the ongoing conceptualization of regional economic resilience by developing a holistic framework for analysis for resource-based economies which can be used as a framework to develop a unified resilience index for resource-based communities in the Canadian context.

1.5 Chapter outlines

Chapter one states the background and justification for the research. The chapter sets the premise for the resilience of RBCs by describing the role of fossil fuel in an urbanizing world and the sustainable development goals of the UN. The role of resource extraction in the Canadian economy and the economic boom in the Province of Alberta since 1970s is described for highlighting importance of RBCs in the Canadian landscape. The long term and short term challenges of RBCs that were discussed included ensuring services to a rapidly growing population, single industry dependence, economic boom-bust cycle, and long-term social and economic resilience. Thus this chapter lays out that a case study on the Town of Devon, Alberta will provide important insight into the resilience of RBCs. The research questions of the case study and the objectives set to find answers to the research questions are described too. The chapter ends with listing out possible contributions of this research and chapter outlines of the dissertation.

Chapter 2 provides the literature review conducted for this study. The nature and challenges of resource-based communities are presented in three major sections. The discussion in the first section includes the definition and specific demographic and economic characteristics of RBCs, staples theory and staples trap model, sustainability problems of RBCs, and the role of local governance in RBCs. In the second section, a brief description of what resilience means and the three major interpretation of resilience (i.e. engineering, ecological, and evolutionary) are presented. In the third section, the concept of regional economic resilience is discussed. In this section several definitions of regional economic resilience, factors used to study regional economic resilience in academic studies, and the results of those studies are elaborated.

Methods used in this research are examined in chapter 3. This chapter is divided into two parts, part 1 and 2. In part one, the case study and the research methodology are presented. A rationale for using case study methodology and mixed methods such secondary quantitative and qualitative data analysis and content analysis are provided. There is a detailed description of the methods used including site selection, selection of federal, regional and municipal data archives, and content analysis of policy documents. The case study's geographic location, history, present social and economic characteristics are presented. This is followed by the data reduction and analysis process and methods followed for ensuring qualitative rigor. In part two, the analytic framework of regional economic resilience is presented. There is a description of the process of framework development. The analytic framework is described in detail.

Chapter four is the results of the analyses of the secondary quantitative and qualitative data from federal census database, provincial and federal open data sources, informal discussion with the municipal authority, and policy documents. This chapter is organized following the structure of the analytic framework of regional economic resilience. Results are presented under the five domains of resilience: economic, social, environmental, infrastructural and governance. There is evidence of a shift towards resilience in the social, environmental, and infrastructural domain, while the resilience of economic domain is influenced by a resource-based economy.

Chapter five presents results from municipal and regional policy content analysis. The content analysis was performed as an independent study to identify major areas of concern with overlapping themes with the secondary data analysis. This chapter provides a detailed discussion on the five themes and thirteen sub-themes identified in the content analysis along with selected quotes from the policies. The results show a policy shift towards resilience of social, environmental, infrastructural, and local governance issues.

Chapter six presents a discussion of the results and the reviewed literature. The results of the secondary data analysis are explored to see if the community is moving on a path of regional economic resilience. The policy directions for future economic, social, environmental, infrastructural and local governance and their probable impact on resilience are discussed. This is followed by providing limitations of the study, recommendations for future research and a concluding remark on the discussion.

Chapter 2: Literature Review

2.1 Introduction

This chapter will provide a review of the relevant academic literature. The first section provides a review of literature related to the impact of resource extraction on socioeconomic aspects and sustainability of a community. The second section considers different conceptualizations of resilience. The third section discusses the definitions and the various factors of regional economic resilience.

2.2 Resource-based Communities

In many aspects, the Canadian economy is different from other advanced economies such as the United States or the United Kingdom. Opposed to most industrialized nations, in Canada, the natural resource sector remains a vital component of the economy, accounting for more than half (53%) of its total export value in 2014 (Natural Resources Canada, 2016). Resource-based communities often referred to as "single industry towns," "boomtowns," "company towns" or "resource-based communities" (RBC), are a common characteristic of the Canadian economic landscape (Halseth & Sullivan, 2004). These types of communities' or towns' economies are overwhelmingly natural resource dependent (Halseth & Sullivan, 2004; Hayter & Barnes, 2015; Keough, 2015; Lawrie et al., 2011; Watkins, 1963). RBCs are often dependent on the export of raw materials that are affected by the demands and prices of external markets (Ryser et al., 2014).

Resource-based communities in the industrialized countries are most commonly identified by their economic boom and bust cycles. Such communities see periods of exponential growth related to the high demand for one or more type of resource commodities (Keough, 2015). Speculation on the value of commodities causes initial growth followed by increased economic

activity which causes rapid population growth (Keough, 2015). Rapid population growth during an economic boom is a common phenomenon for RBCs. A resource boom typically leads to planning problems such as a shortage of affordable housing and inadequate municipal services (recreational facilities, capital intensive projects like water or sewage treatment plant), raising concern about the quality of life within the community (Keough, 2015). People are typically attracted to these places because of employment opportunities (Halseth & Sullivan, 2004). Resource-based communities face the threat of economic downturn during a bust in the natural resource industry or the depletion of resource reserve. During bust periods there is a struggle to cope with the decline in revenues while attempting to reduce the impacts of unemployment. During this time community organizations and community services are more likely to be affected by cost cutting (Soucy & Wrobel, 2000). According to the theory of urban decline, a city is more vulnerable to decline in economic cycles when there are fewer major industries located there. Additionally, industrial diversity ensures stability during an economic crisis, characteristics absent in RBCs (Friedrichs, 1993). Many resource-based communities experience several boom and bust cycles and associated fluctuations in income, workforce, and population during the extraction period (Martinez-Fernandez, Wu, Schatz, Taira, & Vargas-Hernández, 2012). Recurring economic cycles with periods of growth and periods of crisis, more commonly known as the boom and bust cycle, is a characteristic feature of a resource-based economy.

The implications of economic boom and bust on resource-based communities have been examined, typically focusing on the decline in socio-economic well-being like increased income inequality and low educational attainment (Haslam Mckenzie, 2013; Hayter & Barnes, 2015; Lawrie et al., 2011; Martinez-Fernandez et al., 2012; Petrova & Marinova, 2013). Research on resource-based communities in the United States shows that RBCs typically have a high median

income but also have a high incidence of poverty and small middle class (Keough, 2015; Lawrie et al., 2011). The presence of high income within RBCs is identified as masking the income inequality present in such communities which is a result of the difference between resource owners or high paid skilled professions and low paid unskilled workforce (Lawrie et al., 2011).

Another aspect of resource-based community is long distance labor commuting i.e. fly – in/ fly – out (FIFO) population often referred to as a shadow population (Keough, 2015; Perry & Rowe, 2015). The hiring of FIFO and long distance commuter workers has become the dominant employment model for resource-rich developed countries like Canada and Australia since the 1980s (Perry & Rowe, 2015). This shadow population exerts pressure on the public services, and in many instances, demographic data of shadow population cannot be definitively collected (Keough, 2015).

2.2.1 Staples Theory and Staples Trap

Staples theory (First proposed by Harold Innis in 1933) is a useful framework to explore resource-based community development in Canada (Hayter & Barnes, 2015; Li, Long, & Chen, 2013; Watkins, 1963). Staples are raw resource commodities, and Staples theory attempts to describe the dependency of the Canadian economy on the successive export of natural resources (Lawrie et al., 2011). The premise of Staples theory is based on a non-existent domestic market for staples and comparative advantage in resource export that makes the resource extraction a primary economic sector and leads to economic growth (Watkins, 1963). Growth in the staples sector is expected to spread their effect on the other sectors of the domestic economy (Watkins, 1963). The comparative advantage of staples export limits the likelihood to diversify economic activities (Hayter & Barnes, 2015; Watkins, 1963). Additionally, firms in the resource extraction industry are often large, oligopolistic, and externally owned and there is less incentive for such

companies to set up economic linkages through research and development. Thus, the spreading effect of resource-based growth is limited, known as the staples trap. The Staples Trap Model asserts resource rent is not reinvested into fast-growing service or manufacturing sector of the economy (Auty, 2001). It has also been argued that resource extraction should be viewed as a route to "progressive underdevelopment" (Freudenburg & Gramling, 1998). The staples trap model predicts an economic collapse and decreasing physical, social, and human capital from the economy resulting in a shortage of public infrastructure, lack of stable and skilled labor supply, and a lack of community cohesion due to non-resident workers. Bhattacharyya and Collier (2013) have empirically demonstrated that resource rent reduces public capital when income, country and time and other variables are controlled (Bhattacharyya & Collier, 2013). The economic challenges related to a staples economy is sometimes referred to as commodity curse by researchers, in particular for cases like resource-rich developing countries with weak governance and political unrest. For industrialized countries with dominant resource sectors like Canada, Norway, Australia, and New Zealand economic challenges arise from price volatility of staples in the global market (Emery & Kneebone, 2013).

2.2.2 Sustainable development in resource-based communities

In this section discussion will be focused on definition, pillars and variants of sustainable development and sustainability challenges in RBCs. Because, social, economic, and environmental challenges within and across RBCS can be framed using a sustainability and planning lens (Hartwick, 1977; Horsley, Prout, Tonts, & Ali, 2015; Zarsky & Stanley, 2013).

The 1987 Brundtland Commission conceptualized sustainable development as the ability to meet the present generation's needs without affecting the future generation's ability to fulfill their needs (Kates, Parris, & Leiserowitz, 2005). The widely used three pillars of sustainable

development adopted at the World Summit on Sustainable development in 2002 are economic, social, and environmental; however, debate continues on the details of these pillars (Figure 2.1).

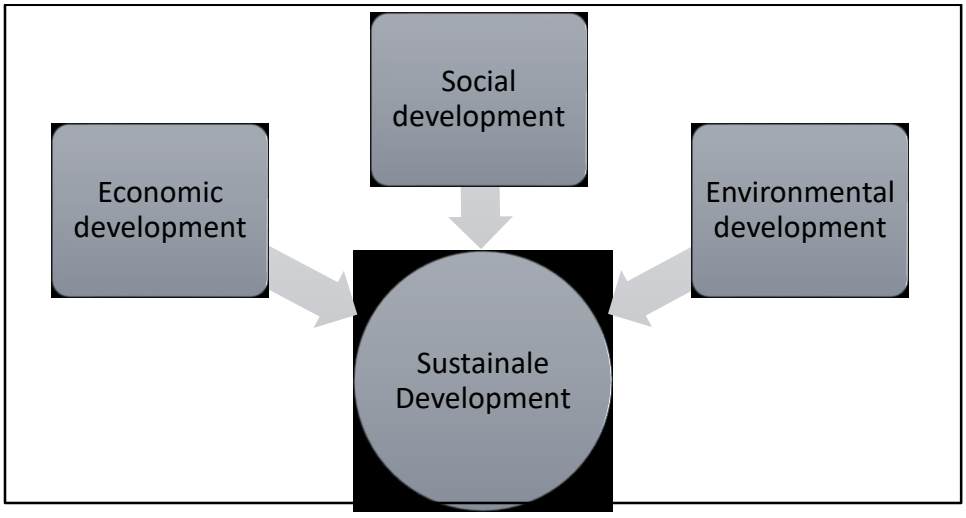

Figure 2.1: Three pillars of sustainable development
Adapted from (Kates et al., 2005)

Under sustainable development, economic sustainability is the most commonly examined aspect of development. However, social and environmental development are also equally important. Economic development focuses on wealth, productive sectors for employment and consumption (Kates et al., 2005). Social development includes a variety of interpretations such as social progress, human development, and social equity (Kates et al., 2005). The environmental pillar is based on biodiversity, ecosystem services, resources and environment (Kates et al., 2005). Two variants of sustainable development based on environmental protection are strong and weak sustainability. (Zarsky & Stanley, 2013). Natural resource extraction industries are unsustainable based on the strong sustainability principles as these are responsible for exhausting non-renewable natural resources. The environmental degradation and depletion of earth's life-sustaining resources are deemed as incommensurable according to the strong sustainability school of thoughts (Martinez-Fernandez et al., 2012; Zarsky & Stanley, 2013). However,

resource extraction can be acceptable by weak sustainability principles if, rational exploitation of nonrenewable resources can ensure the balancing between consumptions of resources and investment in produced capital for future consumptions (Hartwick, 1977; Zarsky & Stanley, 2013). Resource extraction can pave the way for sustainable development if the net benefit of the activity to the community and the government, continues in operation and post-closure phase of mining (Zarsky & Stanley, 2013). In many instances, gains in economic sectors from resource extraction do not translate into gains in social and human development or long-term economic development. The economic benefits do not continue indefinitely and that coupled with environmental degradation leads RBCs to an unsustainable path (Martinez-Fernandez et al., 2012).

Social and human development in many resource-based communities is hampered by a lack of investment in infrastructure (e.g. community halls, recreational centers, repair and maintenance of local roads). Additionally, the usage of existing infrastructure by shadow population adds additional pressure on finite amenities and services of the communities. Access to power, water, health, education, quality of natural and built environment, and remoteness of the RBCs from services are key factors to attract further investment in local infrastructure which builds social and human development and promotes resident attraction and retention. Adequate housing is cited as perhaps the most important factor to attract and retain residents in resource-based communities (McKenzie & Rowley, 2013). Housing is also interconnected with economic, social, and environmental indicators such as social cohesion, health, education, income inequality, and marginalization of disadvantaged groups (McKenzie & Rowley, 2013). For example, during a “boom” in the oil and gas sectors, Canadian RBCs typically experience a shortage in affordable housing supply and inadequate infrastructure and services, even though

such communities contribute significantly to the national economy (Keough, 2015; McKenzie & Rowley, 2013).

The negative impacts of resource extraction on the economic sustainability of a community can be exacerbated by an over-dependence on one particular sector, for example, the mining sector (Robertson & Blackwell, 2014). When a mine closes or the value of a commodity decreases, the economy of an RBC often is negatively impacted and begins to contract. In extreme cases, contraction may lead to the death of the RBC. For example Schefferville in Quèbec was officially closed when the nearby mine was shut down (Belliveau, 2015). Another potential negative associated with single-resource reliance relates to the wages of non-resource jobs; local businesses offering lower wages than that in extraction industry often find it difficult to fill positions during boom periods (Petrova & Marinova, 2013). Additionally, since the mid-1980s, there has been an increase in usage of a non-permanent FIFO workforce which has created discontent among permanent residents, as FIFO workers are often blamed for negatively impacting the economies of remote RBCs and degrading the communities' image (Perry & Rowe, 2015).

Resource-based communities often struggle to diversify their economy (Freudenburg & Gramling, 1998; Halseth & Sullivan, 2004; Robertson & Blackwell, 2014). Many economic strategies to diversify RBCs have been attempted including promotion of mining-specific technological services development, ICT (Information, Communication, and Technology) based development, and promotion of tourism and recreational opportunities (Martinez-Fernandez et al., 2012). An RBC's proximity to industry, and research and development-intensive (R&D) facilities (e.g. universities/colleges), as well as specific business services (e.g. adequate communication infrastructure), promote innovation and growth (Feldman & Florida, 1994).

The government has a critical role in guiding local level diversification and community development initiatives and mitigating negative social, economic and environmental impact of resource extraction. These impacts can be mitigated by co-management between community and government sectors (McKenzie & Rowley, 2013). The role of local government played in this context is crucial. A major challenge for local governments is the lack of resources for playing both the role of service provider and people's representative of RBCs (Cheshire, Everingham, & Lawrence, 2014). Studies showed that in Canada, Australia, and New Zealand, service delivery responsibilities of local governments have increased compared to traditional capital intensive service delivery to property in the last decade, this growing managerialism has caused distancing of people from decision making (Cheshire et al., 2014).

At the social and governance-related domains, local government initiatives to promote community engagement in municipal affairs within RBCs has been proved somewhat promising (Martinez-Fernandez et al., 2012). For example, academic studies on RBCs across rural Australia have found that community organizations try to maintain the community spirit in the transient boom and bust cycle.

Resource-based communities go through social change with rapid economic and population growth, and transiency is one of its primary features. Achieving social sustainability for resource communities needs attention to accommodate the change and not on protecting the existing social structure (Petrova & Marinova, 2013). Since sustainability concerns in RBCs indicate that transiency in the economic and social domains are the primary challenge, the concept of resilience provides a useful framework to examine these problems. Resilience enables the examination the phenomena of change and transition from one equilibrium to another equilibrium point in a particular system. The idea of resilience has evolved since the 1970s and

can be a useful framework to address the variable socio-economic system typical of RBCs. The next section will elaborate on the various conceptualizations of resilience.

2.3 Resilience

The word resilience originates from the Latin word, "resilire" meaning to leap back or to rebound (Martin, 2012; Modica & Reggiani, 2015). Three primary interpretations of resilience theories will be expanded in the next sections: engineering, ecology, and evolutionary (Table 2.1) (Christopherson et. al., 2010; Davoudi, 2012; Martin & Sunley, 2015).

2.3.1 Engineering resilience

According to Holling (1973), engineering resilience is the ability of a system to return to a steady-state or equilibrium after a shock or disturbance. Engineering resilience explains how systems are to return to an equilibrium point after a disruption (Pickett et. al., 2004). Holling (1973) made the distinction between engineering and ecological resilience in a 1973 article (Resilience and Stability of Ecological System) (Davoudi, 2012).

2.3.2 Ecological Resilience

Ecological resilience focuses on system's capability to resist shocks. Ecological resilience examines how much disturbance can be absorbed by a system before it changes its structure (Davoudi, 2012). For example, when large shocks are required to transform a system's structure, that system is argued to be more resilient (Simmie & Martin, 2010). This conceptualization of resilience has two implications. First, there can be more than one stable state for a system (e.g. multiple equilibria). The significant difference between ecological and engineering resilience is, engineering resilience does not take into of multiple equilibria that are more than one stable state for a system. The second implication is that a focus on the stability and shock absorption capacity does not make it greatly different than engineering resilience (Gunderson, 2000). This

focus on shock absorption indirectly implies that maintaining the original state of equilibrium indicates resilience of the system which is very close to the definition of engineering resilience. The conceptualisation of ecological resilience promoted a discussion of evolutionary analysis (Martin & Sunley, 2015). To address a system's multiple equilibrium and evolutionary process (e.g. shifting from one stable state to another), resilience theories that specifically focus on the adaptive or evolutionary ideas of resilience were developed (Martin & Sunley, 2015; Simmie & Martin, 2010).

2.3.3 Evolutionary resilience

Evolutionary resilience stems from the concepts of uncertainty and insecurity and the human quest for survival and adaptation in changing situations (Christopherson et al., 2010). An evolutionary interpretation of resilience can be understood as a system's adaptability as a response to disturbance (Simmie & Martin, 2010). According to Pike et al. (2010), adaptability is the ability of a system to adjust and adapt to internal or external forces of change. Evolutionary resilience is based on the understanding that a perceived stable state of nature or society can change and evolve into a new regime of stability through different types of shocks to the system (Davoudi, 2012).

Table 2.1. Three major interpretation of resilience

Engineering resilience	Explains ability of a system so to return to a steady-state or equilibrium after a shock or disturbance
Ecological resilience	Discusses how much disturbance can be absorbed by a system before it changes its structure
Evolutionary or Adaptive resilience	the stable state of nature or society can change and evolve into a new state of stability through different types of shocks to the system

2.3.4 Resilience from a socio-ecological perspective

The aforementioned conceptualizations of resilience depict a gradual transition from an engineering and ecological perspective to a socio-ecological understanding and interpretation. A resilient system adapts in ways that do not disrupt functions of the system while staying on the present trajectory or moving into a new one (Davoudi, 2012; Pike, Dawley, & Tomaney, 2010; Simmie & Martin, 2010). According to Davoudi (2012), four critical issues should be examined when resilience is applied to the human world. The first issue is examining how intentional human intervention can disrupt the adaptive cycle (Davoudi, 2012). For example, change in industrial or trade policies can impact the resilience of a region The second examines what should be considered a resilient outcome. Contrary to ecological literature where the desirable outcome of resilience is sustainability, in the social context, deciding on what is resilient is subject to normative judgments (Davoudi, 2012). The third issue related to resilience in a social context examines how to set the boundary of the system (Davoudi, 2012). For example, in a particular social context, a bounded approach of resilience may inadvertently lead to exclusionary practices or results. The fourth critical aspect of translating resilience from ecology to society focuses on power and politics; (Davoudi, 2012). Which involves making a note of what is the desired outcome and for whom is that result appropriate for. All four of these issues are critical in the discussion of the resilience of regional economies.

2.4 Regional economic resilience

Interest in the resilience of local, regional, and national economies has been gaining attraction in academic circles in the recent years (Christopherson, Michie, & Tyler, 2010; Eraydin, 2016; Martin & Sunley, 2015; Martin, 2012; Modica & Reggiani, 2014). Researchers maintain a diverse interpretation of the concept of regional economic resilience, what factors affect this resilience, and how to analyze and measure it (Martin & Sunley, 2015). Despite its infancy and

apparent ambiguity in definition, studies of regional economic resilience attempt to examine why some regions can overcome short-term or long-term financial crisis better than others (Christopherson et al., 2010).

Definitions of regional economic resilience have evolved through a process similar to the concept of resilience (Table 2.2). Among the varied definitions of regional economic resilience, for the purpose of this thesis, a definition provided by Martin and Sunley (2014) will be used. Martin and Sunley define regional economic resilience as the capacity of a regional economy to withstand or recover from shocks (market and environment) to its growth path (Martin & Sunley, 2015). They argue that a resilient economy will experience adaptive changes in its structure (i.e. economic, social, and institutional) to restore the original growth path or transfer to a new one (Martin & Sunley, 2015). Additionally, economic resilience is considered as a process that includes vulnerability, shocks, resistance, robustness, and recoverability. Throughout this process, regions move on from pre-shock development paths to post-shock growth paths. Adaptive measures to shocks and growth paths of regions are subject to human intervention and regions are produced and shaped by the political and economic decisions and such normative decisions influence resilience building in regions (Christopherson et al., 2010).

Table 2.2: Different definitions of regional economic resilience

Author	**Definition**	**Nature of Resilience**
Foster (2007)	the ability of a region to anticipate, prepare for, respond to and recover from a shock or disturbance (Foster, 2007)	• Single equilibrium • Engineering resilience
Simmie and Martin (2010)	the ability to continue the region's pre-disturbance framework and function after a shock to the regional economic system (Simmie & Martin, 2010)	• Single equilibrium • Ecological and engineering resilience
Martin (2012)	the capacity of a regional economy to reconfigure its firms, industries,	• Adaptive resilience

Author	Definition	Nature of Resilience
	technologies and institutions to maintain an acceptable growth path over time reflected by output, employment, and wealth (Martin, 2012)	• Maintenance of an acceptable growth path (single equilibrium) is resilience • Close to engineering resilience
Martin and Sunley (2015)	The capacity of a regional economy to withstand or recover from shocks (market and environment) to its growth path, possibly going through adaptive changes in its economic, social, and institutional structure, to restore the original growth path or transferring to a new one. Regional resilience as a process that includes vulnerability, shocks, resistance, robustness and recoverability. Regions move on from pre-shock development path to post shock growth path (Martin & Sunley, 2015)	• Adaptive resilience • Multiple equilibrium • Evolutionary resilience

2.4.1 Factors of regional economic resilience

Several researchers (Christopherson et al., 2010; Cutter et al., 2008; Eraydin, 2016; Foster, 2007; Graziano & Rizzi, 2016; Martin & Sunley, 2015; Martin, 2012; Osth et al., 2015; Simmie & Martin, 2010) have developed methodologies using various types of factors for exploring regional economic resilience which can be organized into categories such as financial, socio-economic, institutional, natural or environmental, and infrastructure (Table 2.3).The results from the studies on regional economic resilience exploring the factors listed in Table 2.3 are discussed after the table.

Table 2.3: Different factors of regional economic resilience

Authors	**Factors of resilience**
Foster (2007)	economic structure, government structure, political mode, state policy, civilian structure
Cutter et. al. (2008)	Infrastructure, institutional plans and policies, environmentally critical area, employment, demographics, housing stock
Christopherson et al (2010)	a regional system of innovation, factors that create a learning region, productive infrastructure, skilled workforce, supportive financial system and a diversified economic base
Martin (2012)	Level of employment in economic sectors
Martin and Sunley (2014)	economic structure, labor market, financial system and governance
Osth et. Al. (2015)	Income inequality, household spending on housing, educational attainment, population over the poverty line, density of civic organization employees in a region, home ownership, voter participation
Graziano and Rizzi (2016)	Population growth rate, innovation, economic infrastructure, business density, social/ health / recreational infrastructure per inhabitants, urban green areas, waste management, ISO certified industries, pedestrian areas, restricted access areas, eco-management, cycle paths, renewable energy
Eraydin (2016)	the diversity of economic sectors, employment distribution in economic sectors, the number of patents per capita, the level of entrepreneurship, educational attainment, the share of employment in science and technology, bank deposit per capita, import, export, public investment per capita, land provided in industrial estates, priority development areas

Social and economic factors of resilience included personal income, GDP, employment, share of science and technology oriented jobs in the economy population growth rate, educational attainment, expenditure on housing, access to social infrastructures, and rich human capital (Christopherson et al., 2010; Eraydin, 2016; Foster, 2007; Graziano & Rizzi, 2016; Martin & Sunley, 2015; Martin, 2012; Osth et al., 2015).

Employment and economic structure are among the most frequently used factors of economic resilience. A study on the regional economic resilience of North East and South East England showed that total employment fell during the recession of the early 1980s (Martin, 2012). The recessionary impact was higher in the heavily manufacturing-reliant North East regions. In the post-recession period growth of fast growing business sectors in South East region was far greater than that in the North East region (Martin, 2012). One study on economic resilience of Turkish regions during the 2008-2011 cycle showed that GDP per capita and share of employment in science and technological sectors made the difference for resilient regions compared to other regions (Eraydin, 2016). The different type of economic factors of resilience indicates that regional economic resilience can change over the time because of the nature of the recessionary shock, structure of the economy and the fact that process of resilience in an economy is dynamic (Martin, 2012). Development of learning region, innovation centers, external trade relations and level of entrepreneurship are considered as factors of regional economic resilience too (Eraydin, 2016; Graziano & Rizzi, 2016). The level of entrepreneurship was found to have an adverse impact on economic resilience of the Turkish regions in the 2008-2011 recessionary period (Eraydin, 2016). Entrepreneurship had negative consequences because the majority of the entrepreneurs were self-employed with little capacity to adapt to economic shock.

Access to social infrastructures for health, culture, and leisure contributed to the resilience of Tuscan- Emilian regions of Italy (Graziano & Rizzi, 2016). The Rich human capital was identified as a key element of resilience in the study of the regional economic resilience of Turkish regions (Eraydin, 2016). Educational attainment , access to health care, and home

ownership was found important for socio-demographic capacity and community connectivity capacity for resilience in the Swedish municipalities (Osth et al., 2015).

The level of infrastructure supply (e.g. transportation, public infrastructure) is another factor that has been considered as crucial for regional development and resilience. Public investment per capita, rates of hospital services usage, community organizations per inhabitant, and lot availability in industrial parks have been used to explore the role of infrastructure in regional economic resilience. A study on the regional economic resilience of the Italian Provinces showed that there was a split between the Northern and Southern Italy as the North is urbanized with better economic infrastructures and were economically more resilient (Graziano & Rizzi, 2016). The southern provinces were socially more resilient than the North because of better access to health, education, leisure and community services (Graziano & Rizzi, 2016). A study of the municipalities in Sweden showed that accessibility to jobs is related to socio-economic resilience (Osth et al., 2015)

The environment is another important factor of regional economic resilience analysis. Factors used to analyze environmental dimension of regional economic resilience included environmentally critical areas, waste management, urban green areas, environment-friendly transportation mode, renewable energy usage and eco-management (Cutter et al., 2008; Graziano & Rizzi, 2016). Studies on Italian provinces showed that small and medium-sized provinces like Mantova, Pisa, and Verbania showed strong environmental resilience due to the presence of municipal green areas, ecological policies, waste management, cycle paths, and renewable energy policies (Graziano & Rizzi, 2016).

Institutional capacity, public policies, and governance have been perceived as important factors of regional resilience in several studies (Cutter et al., 2008; Foster, 2007). Factors used to explore the role of governance included analysis of policies and economic planning programs, the density of civic organization employees and voter turnout (Eraydin, 2016; Osth et al., 2015). The study on Turkish region showed that existing regional policies were not effective to build resilience against recessionary shocks (Eraydin, 2016). Eraydin argued that regional policies were not effective because often the recessionary shocks were happening at the state level and the policies were not focused on developing a resilient region. Graziano and Rizzi showed in their study of the Italian regions that intense relationship between individuals and institutions made provinces socially resilient (Graziano & Rizzi, 2016). The Italian study also showed that environmentally vulnerable areas had a greater focus on palliative or preventive environmental policies and had better environmental resilience (Graziano & Rizzi, 2016).

Chapter 3: Methods

3.1 Introduction

This chapter provides an overview of the research design employed in this study. This chapter is divided into two primary sections. The first section is sub-divided into several sub-sections. The first sub-section provides a reintroduction to the study objectives. The second sub-section is a discussion of the theoretical framework used for this study. Along with the theoretical framework, the research methodologies used for data collection are elaborated. The method of data collection and analysis procedure of the qualitative and quantitative strands of data are provided. Additionally, a description of the study area and brief history will be provided. The final sub-section will provide the description of qualitative rigor of the study and the methods employed to ensure the reliability of the results.

The second section of this chapter provides an overview of the analytic framework for regional economic resilience developed for this case study.

3.2 Theoretical framework and research methods

3.2.1 Objectives and research questions of the study

There are three objectives of this research.

1. To develop a conceptual analytic framework to evaluate regional economic resilience of a resource based community
2. To assess economic, social, environmental, infrastructural forms of resilience and role of governance from publicly available archived quantitative and qualitative data based on the developed analytic framework
3. To identify priority development areas of municipal and regional policy documents through content analysis and assess the role of governance in directing the regional economic resilience of Devon

The three objectives relate to the following research questions:

1. What role do the economic, social, environmental, infrastructural, and governance factors have in making a resource-based community in Canada more or less resilient?
2. How do government policies influence resilience in economic, social, environmental, and infrastructural domains within a Canadian resource based community?

3.2.2 Theoretical and philosophical perspectives

Theories in research provide a perspective for setting research questions, data collection, and analyses and guide researchers towards what is important to investigate (Creswell, 2014). A theory performs the function of indicating some aspects of the world and clarifying why it is like that (Maxwell, 2013). The theoretical perspectives and methodology applied for this research are discussed in the next sections.

3.2.2.1 Critical Realist Perspective

Creswell states that three elements are central to a research design: a theoretical perspective, research methodology, and methods of data collection (Creswell, 2003)**.** Theoretical perspectives of knowledge claim focus on ontology (what is knowledge) and epistemology (how we know that is nature of knowledge) (Creswell, 2003). According to Maxwell, critical realism is a philosophical position that has gained acceptance in the world of social research (Maxwell, 2013).

Critical realism combines two opposite views: ontological realism and epistemological constructivism (Maxwell, 2013). Ontological realism posits that there is a real world beyond our perceptions of it while epistemological constructivism is the theory that our perception of this world is our construction and can never be true (Maxwell, 2013). Critical realism emphasizes ontology; it strongly holds that there is a real world independent of our interpretation

(Zachariadis, Scott, & Barrett, 2010). Therefore no theories or models or interpretation can claim to represent the complete truth of the real world.

3.2.2.2 Pragmatist approach

A pragmatic worldview is developed from actions, situations, and consequences (Creswell, 2014). Pragmatism is based on many ideas (e.g. a research question is more important than specific theoretical perspective or methods) and that a practical research philosophy will direct the methodological choice (Cresswell & Clark, 2011). Pragmatists believe that there are multiple realities and there can be many positions used to explain reality (Cresswell & Clark, 2011). Researchers have adopted pragmatism as a philosophical underpinning of mixed methods studies (Creswell, 2014). Individual researchers choose methods, techniques, and procedures that best suit their research problem (Creswell, 2014). The use of methods is pluralistic, and the focus is on the consequences of the research problem (Cresswell & Clark, 2011). Unlike a researcher's impartiality towards research question in post-positivist research or closeness in constructivist approach, in pragmatism, the researcher adopts a relationship of practicality with the research problem (Cresswell & Clark, 2011). Case study research methodology is compatible with a pragmatic approach, as the research design utilizes pragmatics in scoping, data collection, and establishing quality in write up (Darke, Shanks, & Broadbent, 1998).

A pragmatist approach is suitable for this study as it explores the factor responsible for making a resource based community economically resilient. Regional economic resilience is a context specific phenomenon, and so are the factors influencing it. Hence an iterative process is required to select the appropriate indicators of resilience for the chosen study area. Pragmatist approach provides the theoretical foundation for this process of iteration.

3.2.2.3 Case study

The case study has a long history as a qualitative research methodology (Flyvbjerg, 2006; Stewart, 2014; Tellis, 1997; Yin, 2012) . Case studies were attributed to the field of anthropology since the early twentieth century, but over time this research design has become a common method of the social sciences (Stewart, 2014). Case study research is a qualitative process of exploring a bounded system (a case) or multiple bounded systems (cases) (Creswell, 2007; Merriam, 2009). The definition of a case study is focused on the unit of investigation rather than the methodology of exploiting a set of methods. It is an exploratory research form, used to get an intimate look at the unit of study, which can be anything from a person or an organization or an organized group or a social situation (Stewart, 2014). It is an empirical inquiry that incorporates a contemporary phenomenon in its real life context when there are no clear boundaries between phenomenon and context (Yin, 2012). It benefits from the prior development of the theoretical propositions to guide data collection and analysis (Yin, 2012).

An important characteristic of a case study is the delineation of the object of study. The unit of analysis is a bounded system. Case studies do not need any particular methods for data collection or analysis (Merriam, 2009). A variety of methods have been used to investigate a bounded system or the object of interest, and thus, case study research design is applied beyond the sphere of traditional sociology (Stewart, 2014). Case study research can include a mix of quantitative and qualitative evidence (Cresswell & Clark, 2011; Yin, 2012). Case study evidence can be collected through reviewing official and personal documentation, archival records, interviews, informal discussions and public consultation, direct and participant observations, and physical artifacts (Yin, 2012). Case study research makes use of a detailed, in-depth data collection procedure involving multiple sources of information (e.g. observations, interviews, audiovisual

materials and documents, and reports) (Creswell, 2007; Merriam, 2009). It relies on multiple sources of evidence while data needs to converge in a triangulating way.

Case studies are useful to create context dependent knowledge of a phenomenon. It is suitable for generalization purposes using falsification tests; these tests involve finding one observation that does not fit a general proposition and requires revision or rejection of that hypothesis (Flyvbjerg, 2006).

Case study research has been criticized as biased towards verification and the findings cannot be generalized (Flyvbjerg, 2006). These are a useful critique to sensitize the researcher; however case study research has also been demonstrated to be rigorous (Baxter and Eyles, 1997). Many experienced researchers have reported that their preconceived hypotheses to be wrong and case findings force them to revise their propositions (Flyvbjerg, 2006). Yin (2012) has argued that case studies do not represent a sample, rather the goal is to expand and generalize theories. Also according to Flyvbjerg, findings from case studies can very well be generalizable using the falsification process (Flyvbjerg, 2006).

Case studies can be intrinsic and instrumental (Merriam, 2009). Intrinsic case studies are focused on the case itself while instrumental case studies provide insight into an issue or a phenomenon, not the case (Merriam, 2009). The case is of secondary interest and it plays a supportive role to help our understanding of the phenomenon. This research is designed as an instrumental case study as the research questions are focused on the phenomenon of regional economic resilience in resource based communities. The Town of Devon is used as a representative site to explore resilience in the stated context.

3.2.3 Methods

Methods applicable to a pragmatic approach and case study methodology implemented for this research are secondary quantitative and qualitative data analyses, and content analysis of policy documents. Secondary data was collected from a variety of data sources including federal census database, federal and provincial open data sources, informal discussions, and municipal policy documents.

This research uses mixed method case study design. This mixed method approach is suitable for this study because different sources of data will help lead to a pragmatic and holistic comprehension of the research problem (Creswell, 2014). This pluralistic approach considers quantitative and qualitative data for factors like economic growth, social development, provision of infrastructure and services, and environmental protection in an RBC and looks into the policy and governance framework which influences it. Reasons for using a mixed methods approach include complementarity, expansion, context setting, and enhancement of quantitative and qualitative findings (Cresswell & Clark, 2011).

In a case study design, techniques for data analysis include pattern matching, explanation building, and simple time series analysis (Yin, 2012). The integration of qualitative and quantitative strands of evidence can be done during data collection and analysis level or in the interpretation phase. In this study a convergent parallel design of data collection and analysis was employed, meaning quantitative and qualitative data was collected and analyzed separately, and findings were merged at the interpretation level.

3.2.3.1 Analysis of secondary quantitative and qualitative data and the data gathered from Informal discussion with municipal authority

Archival records are relevant sources of secondary data for many case studies (Yin, 2012). Archival records include public access files such as federal, provincial and municipal census, service records, budgets, maps and charts, and survey data produced by others (Yin, 2012). Regional economic resilience is a macro-level phenomenon meaning resilience is affected by several factors working from within and beyond the region's boundaries (Eraydin, 2016). Analysis of indicators such as income, population growth rate, and employment share can be useful to evaluate a community's performance within the current social and economic structures. Archival records (e.g. census database, municipal budgets, and reports) are reliable and credible sources of information on these indicators. However, for several sub-factors of resilience (e.g. the number of staff in a hospital) secondary qualitative data was not readily available, and in those cases, informal discussions with municipal authorities were utilized to collect data. Use of varied sources for data analysis also makes the study framework replicable for similar other case studies.

3.2.3.2 Content analysis of municipal and regional policies

Content analysis is an extensively used qualitative research method for analyzing text data (Hsieh & Shannon, 2005). The primary focus of content analysis is the substance of the text under scrutiny, and the goal of this method is to create knowledge about the phenomenon under study (Hsieh and Shannon, 2005). In this study, the purpose of the content analysis is the subjective interpretation of policy documents through using systematic classification via coding and identification of themes. Documents hold a significant role in case study research (Yin, 2012). While conducting a content analysis of policy documents, the objective, and intended purpose is critically interpreted. Content analysis of policy documents is used in this research because economic resilience is intricately related to local and regional policy framework. This

study is concerned with the identification of themes and priority areas for policy intervention in government documentations. The findings from the policy content analysis will provide an understanding of the role of policies on factors of regional economic resilience and what is the future direction of the process of resilience building in the community.

3.2.3.3 Site selection

The Town of Devon is the study area for this case study. In this case study, the focus is to analyze regional economic resilience in a resource-based economy, and the selected study area provides a supportive role to broaden our understanding of this issue. Historically, Devon has been classified as a resource-based economy, originally developed to house oil workers. This emphasis has continued as seen by the percentage of residents who were employed in the oil/gas/mining sectors in 2013 (N=19%) (Town of Devon, 2014). However, it should be noted that the influence of Edmonton, the provincial capital and city of more than one million people, as well as the influence of the broader global economic system, has growing impacts on Devon's local economic structure. However, the ongoing local reliance on extractive industries makes Devon a suitable choice for the case study.

3.2.4 Study profile

Devon is located approximately 27 km (17 miles) southwest of downtown Edmonton (Town of Devon, 2006). Devon is situated along the North Saskatchewan River. There are two primary highways that serve the Town: Highway 60 runs north-south, and Highway 19 runs in the east-west (Town of Devon, 2012b). Leduc County surrounds Devon to the south, east, and west while Parkland County is situated to the north. The Nisku Business Park and the Edmonton International Airport are both situated east of Devon (Town of Devon, 2012b). The town was built as a model town for oil workers in 1947 after oil was discovered in the Leduc 1 well by

Imperial Oil (Town of Devon, 2012b). Presently, Devon maintains its local service center function while serving as a residential community for employment centers in the region, including the City of Edmonton, the Edmonton International Airport, and the Nisku and Acheson Industrial Parks (Town of Devon, 2012b). Devon`s regional setting and layout plan are provided in figure 3.1 and 3.2.

According to the 2014 Devon municipal census, there are 6,650 residents (Town of Devon, 2014). In 2006, the retail trade industry had the largest employment share (12.85%) followed by mining and oil and gas extraction (10.91%). Devon's average private household income was $83,569 CAD and home ownership was 80% in 2006. In terms of education, Devon's high school completion rate was 76.1 (2014) and 10.08% of the population had obtained a university degree.

Figure 3.1: Regional setting of Town of Devon

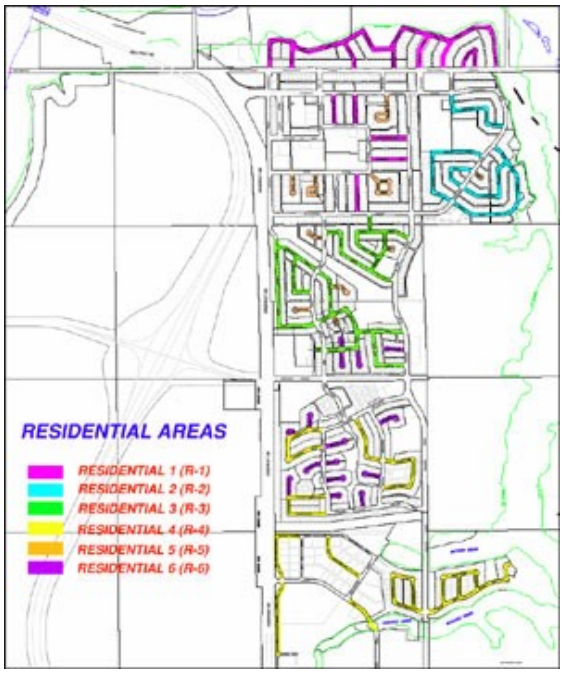

Figure 3.2: Town of Devon neighborhood and arterial layout

Source: MDP By-Laws, 2006 and Town of Devon, 2016

Devon was initially developed for residential purposes, however; commercial sectors have developed. According to Devon's 2006 Municipal Development Plan (MDP), the municipality wants to focus on the development of its industrial sectors by taking advantage of its spatial proximity to major industrial and transportation infrastructure (Town of Devon, 2012b). Devon is a member of the Alberta Capital Region Board and River Valley Alliance. Devon is also a participating member in the Leduc-Nisku Economic Development Authority. As a result, regional policies like the Capital Region Growth Plan (2009), and The Inter-Municipal Development Plan (2011) have an important role on Devon's economic resilience.

3.2.5 Data Reduction and Analysis

3.2.5.1 Analysis of Quantitative and qualitative data

In addition to municipal data, Statistics Canada served as the primary archived data source. In the absence of secondary quantitative and qualitative data, informal discussions with the municipal authority were performed.

Quantitative data for this study was gathered from publicly available data depository of Statistics Canada, Alberta Open Data, and archival records of the municipality of Devon. Federal Census data were subjected to time series analysis. For this purpose, municipal census data was gathered from 1991 to 2006. This time span was chosen as it contains a complete economic cycle of growth and decline. It should be noted that because the 2011 census did not include the long census for, this year was not included in the analysis. Data analysis was limited to census 2006 to maintain its integrity and comparability. For the time series analysis of census data spreadsheet application, Microsoft Excel 2016 was utilized. The results of the analyses were presented in charts, graphs, and tabular format. Secondary qualitative data and data collected from informal discussion with the municipal authority was analyzed to explore complementarity with the

findings from quantitative data analysis and extend the understanding of resilience in the study area.

3.2.5.2 Thematic content analysis of policy documents

Documents chosen for content analysis included municipal planning documents, municipal records of utilities and services, and government reports. Initial analysis of these documents provided context and helped refine the analytic framework. Content analysis of municipal and other government documents provided the policy context for trends in economic and social indicators for Devon.

Qualitative content analysis of relevant policy documents explored policy directions regarding socio-economic and environmental resilience and sustainability in Devon in recent years (i.e. 2006 – 2012). A thematic content analysis was completed by employing the qualitative analysis software package NVivo 11. Thematic analysis of these documents involved multiple readings and interpretations of the text. From these readings, emerging themes were structured into a framework comprised of nodes [or codes] and are described as discrete units of text (DUTs) within the documents. Based on the conceptual analytic framework, policy documents were initially coded into five primary nodes: economic growth, community development, environmental protection, infrastructure and services, and regional planning. As the selected DUTs were coded further into sub-themes, the database of nodes expanded. Similar nodes were merged or (re)arranged into a two-tiered hierarchical structure to prevent loss of DUTs. Under the five themes derived from content analysis, 13 sub-themes were identified. There was a significant number (N=134) of DUTs from the ten policy documents selected for the content analysis. Therefore, text units selected for presentation in quotation form were chosen if those met one or more of the following conditions:

- Conveys a complete idea of a theme
- Presents a contradictory view

3.2.6 Qualitative rigor

A research design represents a set of logical statements, and its quality can be evaluated through certain logical sets of the statement (Yin, 2012). Four criteria are widely used by qualitative researchers to assess the trustworthiness of the studies; those are credibility, transferability, dependability, and confirmability (Baxter & Eyles, 1997; Birks, 2014; Yin, 2012). These four criteria are comparable to validity, reliability, and objectivity used to evaluate quantitative research (Birks, 2014).

3.2.6.1 Credibility.

Baxter and Eyles (1997) describe credibility as the representation of reality in an adequate way so that both the group experiencing the phenomenon and the wider scientific community can both understand the reconstruction of the reality. Credibility in qualitative research is measured by multiple means including triangulation, member checking, external auditor, and clarifying researcher's bias (Creswell, 2014). Maxwell (2013) identifies researcher's bias and reactivity of researcher on an individual or the setting studied as two threats to the validity of research. Using multiple sources of evidence and developing a chain of evidence is considered a useful way to validate case study research (Yin, 2012). For this study, member checking and the inclusion of multiple sources of data for developing a chain of evidence have been used to ensure validity and credibility of findings. Additionally, data from Statistics Canada archived municipal records, and policy documents for the municipal and regional levels are used as sources of qualitative and quantitative data. Census data, archival records, and policy documents had been through validity and credibility checks which are beyond this study's scope. The analytic framework was

finalized after several public consultation sessions with the municipality to ensure validity and replicability the framework.

3.2.6.2 Transferability

Transferability can be defined as the level the findings which can be generalized outside the context of the study (Baxter & Eyles, 1997). Describing the study context in detail is important to determine the degree to which the findings can be transferred to another context. In this study, a rich description of RBCs and the study area of Devon is provided. This description sets Devon within the context of resource extraction and contributes to the transferability of the findings to contexts external to Devon.

3.2.6.3 Dependability

Dependability refers to the degree to which the design induced changes and the level of consistency of the same construct to match with the same phenomenon over space and time (Baxter & Eyles, 1997). Strategies to ensure dependability include field notes, recorded data, participant researchers, and peer examinations (Baxter & Eyles, 1997; Yin, 2012). For this project, data collection steps were recorded in memos and researcher's journals. Secondary quantitative data were managed with spreadsheet software and information collected from municipal and provincial sources were collected in digital format. While selecting data sources of quantitative indicators, Statistics Canada was selected over Municipal Census database for the methodological integrity of the data throughout the Province and the country. Also, data from Federal Census 2011 was not included in trend analysis to ensure data comparability and methodological integrity (for reasons explained previously).

3.2.6.4 Confirmability

Confirmability can be defined more broadly than the notion of objectivity, where researchers show their account for their motivation by showing how the interpretation affects them (Baxter & Eyles, 1997). Confirmability highlights the audit process of raw data, data reduction and analysis products, and process notes, and an account of the audit process. The next section highlights how potential bias may influence the outcome of this study.

3.2.6.4.1 Reactivity and Researcher's bias

Reactivity of the researcher on the case setting or individual was not applicable for this study since the study did not involve interviewing or participant observation methods to collect data. As an international student with no prior experience in Canada, the researcher had some benefit of distance, impartiality, and objectivity towards the study area and the research topic as a researcher. However, lack of prior experience with the study setting may also influence the interpretation of study findings, depending on what literature is reviewed to understand the context. Public consultations with the municipality of Devon and background research on the history of the resource based communities were employed to compensate for any knowledge gap and unfamiliarity with the case study area.

3.3 Development of Analytic framework of regional economic resilience

The analytic framework to explore economic resilience of resource extraction based regions has been developed through an iterative process. The process included a review of existing literature on measurement and analysis of regional economic resilience, four consultation sessions with municipalities in the capital region of Alberta and the Town of Devon, and full consideration of the availability of data and information in public domains and with the municipality. In this case study, a conceptual analytic framework of regional economic resilience has been developed. The indicators in the framework were selected based on literature review and from an inventory

search of publicly available quantitative and qualitative data. After that, four public consultation sessions and online consultations were performed with several municipalities located in the capital region of Alberta: The Town of Devon, The City of St. Alberta, The Town of Olds, and the City of Airdrie. Initially, all these municipalities were consulted together via web-based video calls. This step was performed to develop a replicable analytic framework. Later the Town of Devon was consulted via phone and web-based video calling applications to identify sources of archived data. This conceptual analytic framework guided the quantitative and qualitative data collection and analysis procedure. The framework for regional economic resilience is described in detail in the next section.

3.3.1 Regional economic resilience analytic framework

In this analytic framework, resilience is conceptualized as an evolutionary process. It is understood as the ability of a community to change from a stable state and evolve into a new state of stability through different types of shocks to the system. Thus, resilience building is perceived as a dynamic process of adaptation to new challenges to the community. The analytic framework illustrates what significant areas of resilience are being considered within an RBC (Table 3.1). The framework comprises of five dimensions of resilience each with unique considerations and areas of focus:

i) **Economic resilience**: trends in employment across different sectors, the external relationship of the community and the capacity and stability of a community's economic base is examined

ii) **Social resilience**: population stability and economic capacity of inhabitants, human capital development, and community amenities are included

iii) **Environmental resilience**: sustainable management and environmental conservation efforts are considered

iv) **Infrastructural resilience**: levels of public investment and assessment of existing infrastructures are considered

v) **Policy/Governance resilience**: included are three areas of discussion, roles of policies on resilience, institutional decision-making, and the process of coordination and public participation in policy decision-making

The indicators considered under each of the five dimensions of resilience are expanded in the following sections to provide a breadth of understanding of the framework.

3.3.1.1 Economic Indicators of Resilience

Economic indicators of resilience are organized into three sub-dimensions: the trends in employment sectors, external relations of the economy, and capacity and stability of the community (Table 3.1). The trends in employment sectors are analyzed by looking at two indicators: employment distribution in economic sectors and share of employment in science and technology. These two indicators are used to understand the diversity of the economic sectors. Additionally, the share of employment in science and technology is used as an indicator of the innovative capacity of the region. Export and import values measure external relations of the community, and a community's economic stability is measured by the level of entrepreneurship and growth of residential and non-residential uses in the community. The level of entrepreneurship is measured by the number of new businesses registered in the community over five years.

Table 3. 1: Analytic framework of regional economic resilience for resource based communities

<table>
<tr>
<td>Economic
<u>Trend in employment sectors</u>
• Employment distribution in economic sectors
• Share of employment in science and technology
<u>External relations</u>
• Export and Import values for last ten years
<u>Capacity and Stability of the Community</u>
• Level of entrepreneurship
o New businesses registered in last five years
• Growth of commercial, industrial, residential uses in the community</td>
<td>Social
<u>Population stability and economic capacity of inhabitants</u>
• Population growth and age-sex composition
• Mobility rate
• Per capita income
• Home ownership rate
<u>Human capital development</u>
• Percentage of university graduate
• Percentage of population with trades certificate
• High school completion rate
<u>Community amenities</u>
• Community interaction expressed as Voluntary service organization, recreational organization per inhabitant
• Health service administration (number of medical staff, nurse available)</td>
<td>Environmental
<u>Sustainable management</u>
• Carbon footprint per individual and businesses
• Urban green area (% of total land)
• Brownfield management (projects were undertaken)
• Waste management (waste generation, landfill site capacity, % of waste recycled)
<u>Environmental conservation</u>
• Conservation projects for critical environmental area
• Bike trails, Pedestrian facilities</td>
</tr>
<tr>
<td colspan="2">Infrastructural
<u>Public investments</u>
• Planned, under construction, completed projects in last five years
<u>Adequacy of existing infrastructures</u>
• Industrial lots
• Local and regional transportation
• Hospital beds available
• Average class size in schools
• Communication network</td>
<td>Policy/Governance
<u>Public participation in decision-making</u>
Voter turnout in municipal, provincial and national elections
<u>Institutional decision-making and coordination process for key areas of resilience</u>
• How need assessment, investment, and maintenance are performed in the following sectors
o Education
o Health
o Environmental management
o Recreational services
o Industrial and Commercial land use
o Transportation and communication
<u>Role of policies on resilience</u>
• Key economic, social, infrastructural, and environmental policies
• Priority development areas marked at provincial and municipal levels</td>
</tr>
</table>

3.3.1.2 Social indicators of resilience

Social indicators of resilience are classified into three sub-dimensions: population stability and economic capacity of inhabitants, human capital development, and community amenities (Table 3.1). Indicators of population stability and economic capacity of the inhabitants include demographic information of the population such as growth and age, sex composition, mobility rate of inhabitants, per capita income, and home ownership. Three indicators measure human capital development: percentage of the population with a university degree, percentage of students in technical education (college diploma), and high school completion rate. The third group of indicators for the social aspects of resilience are: community interaction expressed as voluntary service organizations and recreational organizations per inhabitants, health care services (number of medical staffs and nurses) available in the community.

3.3.1.3 Environmental indicators of resilience

Environmental indicators are grouped under two sub-dimensions: sustainable management and environmental conservation (Table 3.1). Four indicators of sustainable environmental management are examined: carbon footprint per individual and businesses, urban green areas as a percentage of total land, brownfield management initiatives, and waste management. The two indicators under environmental conservation include conservation of the critical environmental area, bike trails, and pedestrian facilities within the community.

3.3.1.4 Indicators of infrastructural resilience

Indicators of infrastructural resilience are grouped under two sub-dimensions: public investments (including planned, under construction and completed projects in last five years) and the adequacy of existing infrastructure (Table 3.1). Existing transportation infrastructure is examined using: local and regional connectivity (i.e. highway, air, and rail network), the level of

service and capacity of internal roads. Health, education, and communication services are evaluated by the number of hospital beds available, average class size in schools, and communication network (i.e. spatial coverage of broadband network and average speed of Internet).

3.3.1.5 Indicators of policy/ governance resilience

Policy and governance aspects of resilience are grouped into three sub-dimensions: the role of policies on resilience, institutional decision making and coordination process for key areas of resilience, and public participation in policy decision-making process (Table 3.1). The indicators to evaluate the role of policies on resilience include priority development areas marked at the provincial and municipal levels in key economic and development policies. The institutional decision making and coordination process are explored by investigating the process of need assessment, investment, and maintenance of education, health, environmental management, recreational services, industrial and commercial land use and transportation and communication. Public participation in policy decision making is evaluated by voter turnout in recent municipal elections.

Chapter 4: Results from quantitative and qualitative data analysis

4.1 Introduction

The next two chapters present the findings from two overlapping studies examining themes of economic, social, environmental, infrastructural, and governance aspects of economic resilience of the Town of Devon. Nevertheless, these should be read as two separate sets of findings. This chapter focuses on the analysis of secondary quantitative and qualitative data and data collected through informal discussion with the municipal officials of Devon relating to economic, social, environmental, infrastructural, and policy/governance domains of resilience per the developed analytic framework (Table 3.1in Chapter three). Chapter five presents the findings from the content analysis of municipal and regional development policy documents. The themes of the content analysis presented in chapter five will be economic growth, community, environmental protection, infrastructure and services, and regional planning.

This chapter is divided into five sections. It begins by presenting secondary quantitative data on economic indicators. Economic indicators of resilience discussed in this section are: 1) employment distribution in economic sectors, 2) the share of employment in science and technology, 3) level of entrepreneurship represented by rate of new business licenses issued, and 4) the growth of industrial, commercial, and residential land uses determined from municipal tax assessment records.

The second section contains secondary quantitative data and qualitative data from informal discussions and secondary sources on social indicators of resilience. The social indicators of resilience discussed here are: 1) population growth rate, 2) resident mobility rate, 3) average personal and private household income, 4) home ownership rate, 5) high school completion rate,

6) post-secondary educational attainment level, 7) number of community organizations, and 8) access to health care facilities.

The third section discusses environmental indicators of resilience. The selected indicators of environmental resilience discuss qualitative data collected from informal discussions and secondary sources on 1) sustainable management practices of waste disposal, 2) brownfields management 3) environmental footprint of Devon, 4) conservation of the critical environmental areas, and 5) bike trails and pedestrian facilities management within the community.

The fourth section discusses indicators of infrastructural resilience. The discussion on selected indicators will present quantitative and qualitative data on: 1) public investments made for planned, under construction, and completed projects in last five years, 2) available industrial lots, 3) local and regional transportation network, 4) health and educational infrastructures, 5) municipal facilities, and 6) communication network.

The fifth section of this chapter presents findings from quantitative and qualitative data on the policy/ governance domain of resilience. The presented data includes 1) voter turnout rate and 2) the municipal decision making and coordination process for factors of resilience

4.2 Economic domains of resilience

For this study, economic indicators of resilience are presented in three areas followed by their respective measurement.

1) Trend in employment sectors: measured by the employment distribution in economic sectors, and the share of employment in science and technology;

2) Capacity and stability of the community: measured by the level of entrepreneurship represented by new business licenses issued, and the growth of industrial, commercial, and residential land uses determined from municipal tax assessment.

4.2.1 Employment sector trends

The trends in employment sectors are examined using two indicators: employment distribution in economic sectors and share of employment in science and technology. These two indicators are appropriate to find out the primary economic sectors of the economy and the level of innovation and technological services within the economy.

4.2.1.1 Employment distribution in different economic sectors

Employment distribution by industry types for Devon (1991 – 2006) is shown in Table 4.1 which illustrates the number and percentage of residents employed in Devon's various economic sectors. As indicated in the table, a total number of employment has increased from 2110 to 3620 in the census period. The composition of employment by different industries have changed at the same time.

The highest employment share was by mining, quarrying and oil-well industries in 1991 with an employment share of 11.85% (N = 2110), manufacturing in 1996 with an employment share of 12.72% (N = 2320), and retail trade in 2001 and 2006 with an employment share of 11.93% (N = 2725) and 12.85% (N = 3620) respectively.

Table 4.1: Employment Distribution by Industry types from Federal Census 1991-2006

	1991		1996			2001		2006	
Industry type	**No. of employment**	**Percentage of employment**	**No. of employment**	**Percentage of employment**	**Industry type**	**No. of employment**	**Percentage of employment**	**No. of employment**	**Percentage of employment**
Agricultural and related service industries	0	0.00	15	0.65	**Agriculture, forestry, fishing and hunting**	10	0.37	45	1.24
Fishing and trapping industries	0	0.00	0	0.00	**Mining and oil and gas extraction**	175	6.42	395	10.91
Logging and forestry industries	0	0.00	10	0.43	**Utilities**	10	0.37	35	0.97
Mining (incl. milling), quarrying & oil well inds.	250	11.85	155	6.68	**Construction**	260	9.54	365	10.08
Manufacturing industries	210	9.95	295	12.72	**Manufacturing**	295	10.83	325	8.98
Construction industries	150	7.11	205	8.84	**Wholesale trade**	160	5.87	185	5.11
Transportation and storage industries	160	7.58	140	6.03	**Retail trade**	325	11.93	465	12.85
Communication and other utility industries	35	1.66	50	2.16	**Transportation and warehousing**	250	9.17	275	7.60
Wholesale trade industries	125	5.92	165	7.11	**Information and cultural industries**	25	0.92	60	1.66
Retail trade industries	235	11.14	250	10.78	**Finance and insurance**	90	3.30	65	1.80
Finance and insurance industries	85	4.03	45	1.94	**Real estate and rental and leasing**	20	0.73	45	1.24
Real estate operator and	45	2.13	20	0.86	**Professional, scientific and**	130	4.77	180	4.97

Table 4.1: Employment Distribution by Industry types from Federal Census 1991-2006

	1991		1996			2001		2006	
Industry type	**No. of employment**	**Percentage of employment**	**No. of employment**	**Percentage of employment**	**Industry type**	**No. of employment**	**Percentage of employment**	**No. of employment**	**Percentage of employment**
insurance agent inds.					**technical services**				
Business service industries	90	4.27	85	3.66	**Management of companies and enterprises**	0	0.00	10	0.28
Government service industries	150	7.11	125	5.39	**Administrative and support, waste management and remediation services**	90	3.30	125	3.45
Educational service industries	125	5.92	175	7.54	**Educational services**	150	5.50	180	4.97
Health and social service industries	125	5.92	205	8.84	**Health care and social assistance**	245	8.99	210	5.80
Accommodation, food and beverage service inds.	145	6.87	145	6.25	**Arts, entertainment and recreation**	45	1.65	45	1.24
Other service industries	180	8.53	235	10.13	**Accommodation and food services**	150	5.50	230	6.35
Total labour force 15 years and over / All industries	2110	100.00	2320	100.00	**Other services (except public administration)**	175	6.42	190	5.25
					Public administration	130	4.77	195	5.39
					Total labor force 15 years and over by industry	2725	100.00	3620	100

As can be seen in Figure 4.1, employment in mining, quarrying, and oil industries declined in 1996 but had a notable increase from 2001-2006. Retail trade and construction industries have experienced steady growth in employment from 1996-2006.

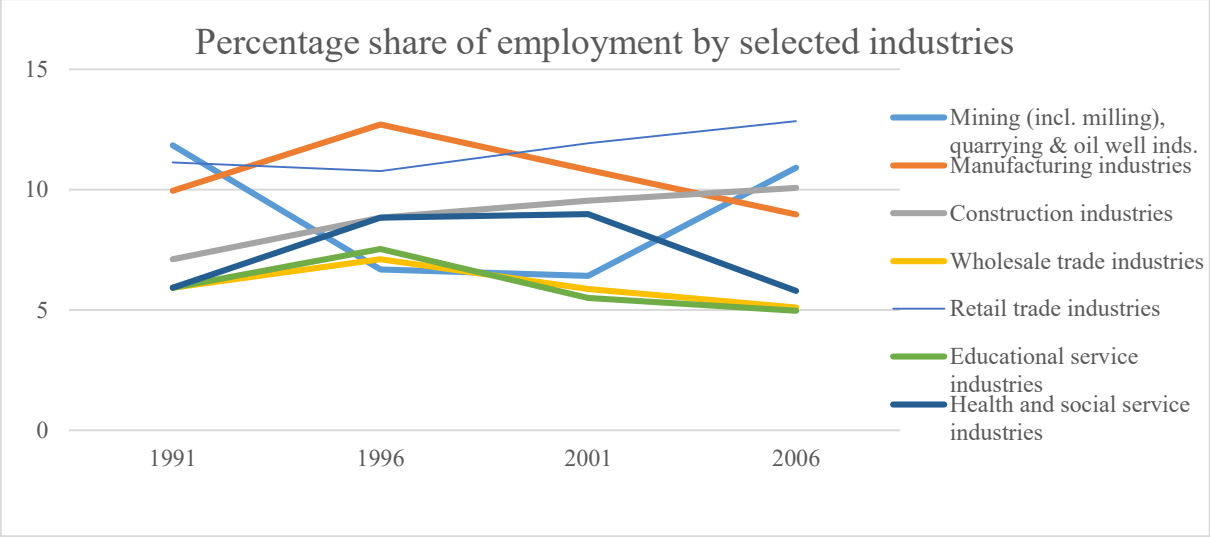

Figure 4.1: Trend of employment share by selected industries from Federal Census 1991-2006 (percentage value)
Source: Statistics Canada

Figure 4.1 also highlights that employment in manufacturing, wholesale, health and social services and education industries have been steadily falling since 1996. This can be partly caused by the growth of mining, quarrying, and oil industries industry and lack of federal spending on social services in the previous years.

4.2.1.2 Employment in science and technology related occupations

While science and technology related occupations have increased from 1991-2006 in absolute value, the percentage of total labor force shows a minor decrease in 2006 (Figure 4.2). However, the growth of science and technology related occupations and growth of employment in the mining, quarrying, and oil-well industries were positively correlated with a value of correlation coefficient of 0.599. The positive correlation indicates that part of the growth in science

technology-based occupations occurred in mining, quarrying and oil-well industries or in the linkage industries (e.g. research and development, business services, transportation).

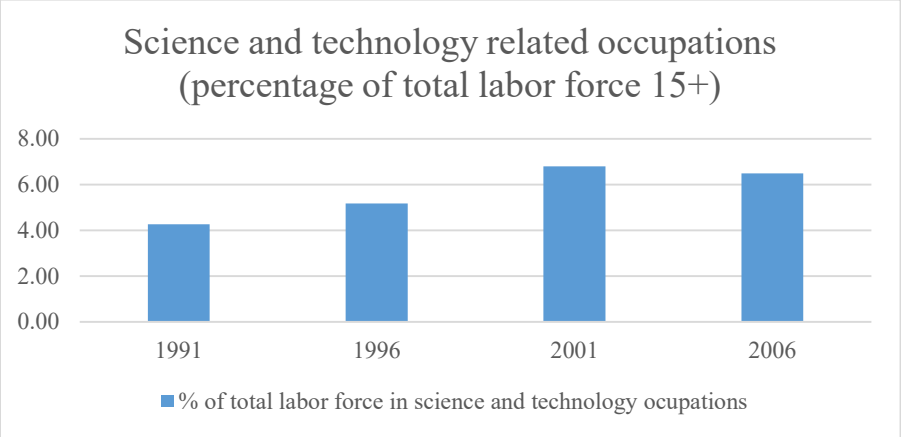

Figure 4.2: Trend of science and technology related occupations in Federal Census 1991-2006
Source: Statistics Canada

4.2.3 Capacity and stability of the economy

Capacity and stability of the economy was measured by the level of entrepreneurship and growth of residential versus non-residential tax bases in the community. The level of entrepreneurship is an important indicator of innovation and adaptation. The composition of the municipal tax base is instrumental in analyzing municipal capacity to balance its income and expenditure.

4.2.3.1 Level of entrepreneurship

The level of entrepreneurship is represented by the type of new business licenses issued in Devon from 2009-2014. In Devon, much of the new business licenses were for resident commercial businesses and home occupation businesses (Figure 4.3). This indicates that not many new businesses starting up in Devon in the industrial sectors.

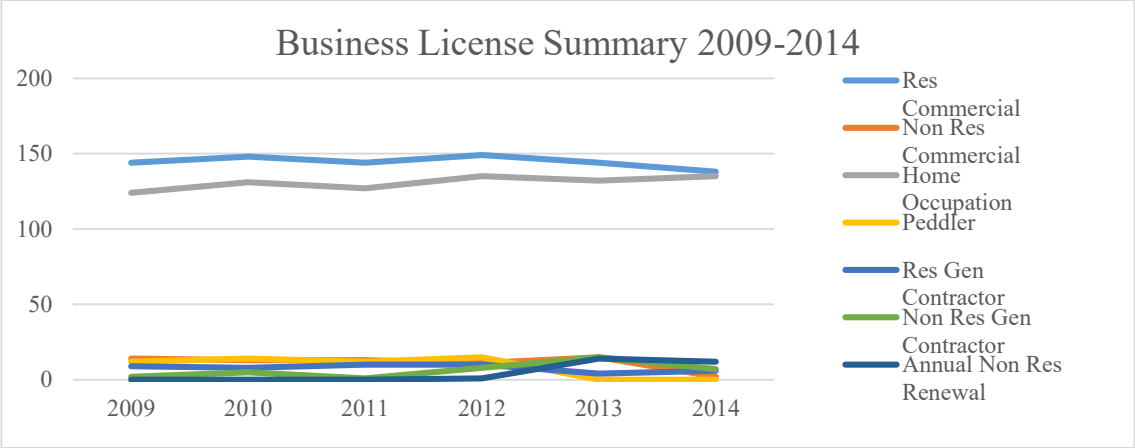

Figure 4.3: Type of business licenses issued from 2009-2014 in the Town of Devon (Source: Town of Devon)

4.2.3.2 Growth of residential versus non-residential tax bases

The taxable assessment of properties from 2015-2016 increased by 5.97% and the largest share is from residential and farmland properties (Table 4.2). Non-residential property tax assessments have increased by 16.94% during the same period. A balanced municipal tax base is promoted for financial stability as residential land uses have higher service and facilities requirements than non-residential counterparts.

Table 4.2: Town of Devon's 2016 taxable assessment compared to 2015

Type	**2015 Tax Year**	**2016 Tax Year**	**% Change**
Residential & Farmland	$739,864,360	$771,808,910	**4.32%**
Non-Residential	112,636,510	131,716,120	**16.94%**
Linear	10,950,580	10,638,070	**-2.85%**
Machinery & Equipment	41,960	42,510	**1.31%**
Annexed Land - Residential & Farmland	1,424,320	1,464,430	**2.82%**
Annexed Land – Non-Residential	1,677,440	2,699,460	**60.93%**
Annexed Land – Machinery & Equipment	112,110	108,300	**-3.40%**
Total	**$866,707,280**	**$918,477,800**	**5.97%**

Source: Town of Devon, tax rate bylaw (888/2016)

4.3 Social domain of resilience

Social indicators of resilience were classified into three groups:

1) Population growth and transiency: measured by population growth rate and resident mobility rate;
2) Economic capacity of residents: measured by average personal and private household income and home ownership;
3) Human capital development and community amenities: measured by high school completion rate, post-secondary educational attainment level, the number of community organizations, and access to health care facilities.

4.3.1 Population growth and mobility

Indicators of population growth and mobility include population growth, age group composition, and mobility rate of residents. These indicators were used to track changes in population growth and resident mobility of Devon.

4.3.1.1 Population growth

Federal census data for Devon (1991-2006) indicate that the net population increased by approximately 50% (Table 4.3). Interestingly, there was a declining growth rate in the age cohort 0-14 during this period (Table 4.3, Figure 4.4). This change may impact future demographics of the town and lead to an older population.

Table 4.3: Population growth in Devon from Federal Census 1991- 2006 (absolute value)

Age group	**1991**	**1996**	**2001**	**2006**
0-14	1175	1225	1205	1390
15-64 years	2665	2955	3360	4315
65 - 74 years	180	115	240	160
75 years and over	65	210	120	230
Total	**4085**	**4505**	**4925**	**6095**

Source: Statistics Canada

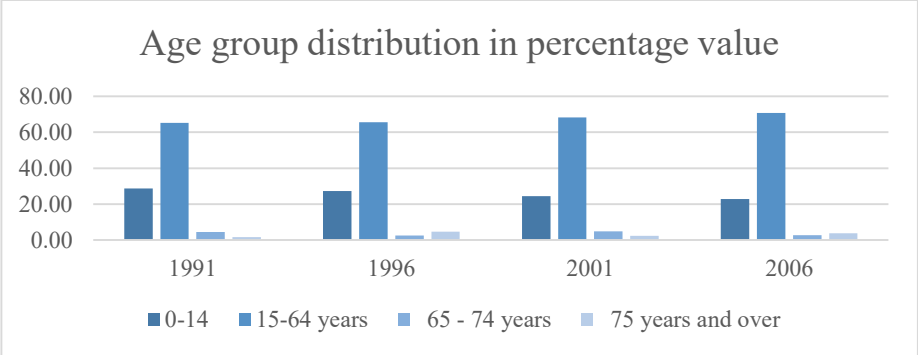

Figure 4.4: Distribution of population in different age groups from Federal Census 1991-2006 (percentage value)
Source: Statistics Canada

4.3.1.2 Population mobility

Population mobility numbers were considered to examine the percentage of residents who have lived in Devon more than one year or over and people who had lived for five or more years. These numbers illustrated the length of residency of Devon's population. There were no significant changes in population mobility during this time; the percentage of residents who had lived in Devon for more than one year remained in a range of 97.87% to 98.47% over the census period (Figure 4.5). The percentage of the population who had lived in the town for more than five years increased from 89.91% to 92.78% between 1991-2001 and slightly decreased to 91.75% in 2006.

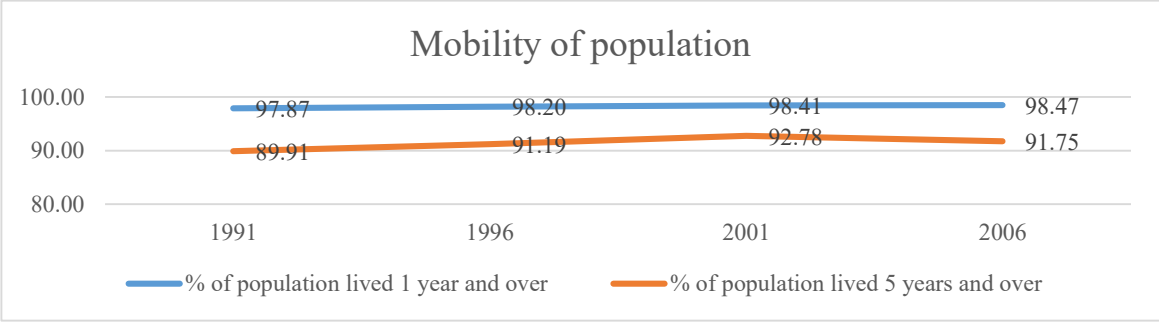

Figure 4.5: Mobility of population from Federal Census 1991- 2006 (percentage value)
Source: Statistics Canada

4.3.2 Economic capacity of the residents

The economic capacity of the residents was measured by three indicators: per capita income, household income, and private dwelling ownership rate.

4.3.2.1 Personal income and private household income

Personal income and private household income increased from 1996-2006 (Figure 4.6). During the same period, the average personal income per capita increased from $24,686 to $40,418 (CAD) an increase of 63.73%. Additionally, private household income increased from $48,816 to $83,569 (CAD) an increase of 71.19%.

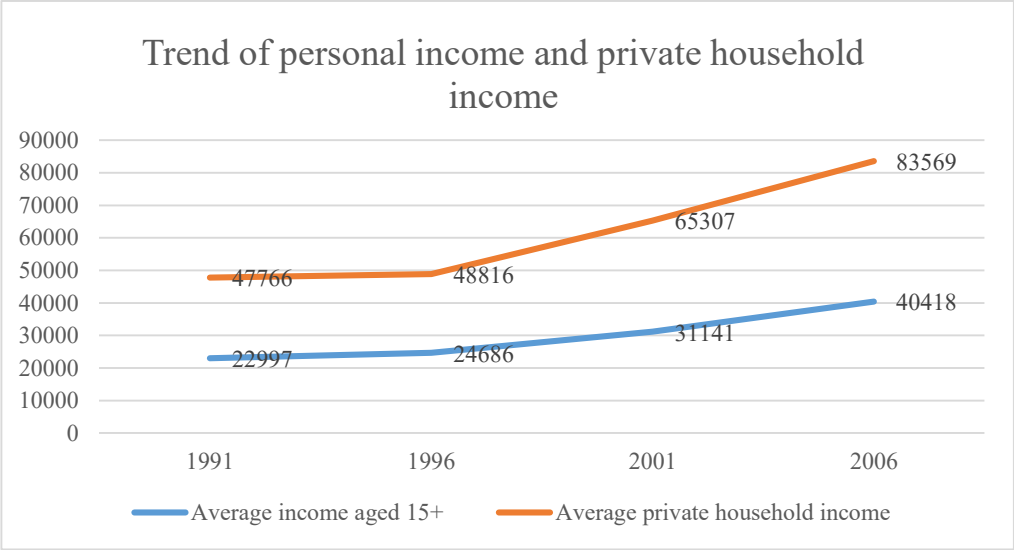

Figure 4.6: Trend of personal income and private household income (in CAD) from Federal Census 1991- 2006
Source: Statistics Canada

4.3.2.2 Ownership of private dwellings

Data from the federal census (1991-2006) indicates that the total number of occupied private dwellings increased by 72.93% (Table 4.4) while the rate of ownership of private dwellings are increased by 74.41% (Table 4.4).

Table 4.4: Share of owned private dwellings over the years from Federal Census 1991- 2006

Year	**Total number of occupied private dwellings**	**Owned private dwellings**	**% of owned private dwellings**
1991	1330	1055	79.32
1996	1505	1160	77.08
2001	1745	1400	80.23
2006	2300	1840	80.00

Source: Statistics Canada

4.3.3 Human capital development

Human capital development is measured by three indicators: high school completion rate, educational attainment beyond post-secondary level (percentage of the population with a university degree, and percentage of students in technical education (e.g. trades certificate or diploma).

4.3.3.1 High school completion rate

Public schools in Devon are administered under the Black Gold Regional Division no. 18 school board. Devon has three public schools: one elementary, one middle school, and one high school. Additionally, there are two catholic schools in Devon offering preschool to grade 9. The Public high school completion rate (3 years) in 2014 was 76.1%, which was higher than the provincial rate of 74.9 (Black Gold Regional Division No. 18, 2014).

4.3.3.2 Educational attainment beyond post-secondary level

The percentage of university graduates in the population increased from 5.52% to 10.08% between 1991-2006 (Table 4.5). At the same time, the percentage of people holding a trades certificate or diploma increased from 4.83% to 12.96% (Table 4.5). However, between 2001 - 2006 percentage of the population with a trades certificate or diploma declined. The percentage of the population with a trades certificate or diploma declined from 17.26% to 12.96% among the total population of aged 15 years or over.

Table 4.5: Educational attainment over the years from Federal Census 1991- 2006

Educational attainment	**1991**	**1996**	**2001**	**2006**
Total population 15 years and over	2900	3270	3765	4860
Number of people with a University degree	160	245	245	490
Percentage of people with a university degree aged 15 or over	5.52	7.49	6.51	10.08
Number of people with a trades certificate or diploma	140	70	650	630
Percentage of trades certificate or diploma holder aged 15 or over	4.83	2.14	17.26	12.96

Source: Statistics Canada

4.3.4 Community services and facilities

Community services and facilities were explored by examining the number of community organizations and the level of health care services (measured by the number of medical staff and nurses) available to the community.

4.3.4.1 Number of community organizations

In Devon, there are 49 active community organizations, 17 recreational organizations, 12 cultural organizations, four human services (e.g. 2561 Thorsby Royal Canadian Army Cadets, Christmas Elves, Battle River Oilers Toastmasters, and Chamber of Commerce), and 11 faith-based

organizations (Table 4.6) indicating that Devon has several community organizations. Community organizations are considered important factors to uphold community spirits during moments of crisis.

Table 4.6: Number and type of community organizations

Type of community organization	**No. of organizations**
Recreation	17
Culture	12
Human Services	4
General Not for Profit	5
Faith Community	11
Total	49

Source: Informal discussion with Town of Devon, 2016

4.3.4.2 Level of health care services

The primary health facility in Devon is the Devon General Hospital. Informal discussion with municipal officials of Devon (2016) revealed that the hospital has an estimated number of 100 nursing or clinical staff. Additionally, approximately 30 emergency room physicians and ten attending physicians are employed in the hospital. Also, there are 10-12 physicians' clinics in Devon. Devon is near Edmonton; therefore, critical patients can access the regional level health care facilities easily. This shows that the town has a moderate level of access to health care.

4.4 Environmental domain of resilience

In the environmental domain of resilience two sub-domains are considered: sustainable management practices and environmental conservation. These two sub-domains are expanded below.

1) Sustainable management practices: management of waste disposal, brownfields, and Devon's environmental footprint

2) Environmental conservation: conservation of the critical environmental areas, bike trails, and pedestrian facilities within Devon.

4.4.1 Sustainable Management practices

4.4.1.1 Waste disposal

Realized waste disposal was slightly above than the planned limit of 500 kg/capita/year set by Devon's Municipal Development Plan (Town of Devon, 2012b). According to the municipal authority of Devon, in 2012 waste generated in Devon was 517.1 kg/capita/year (Informal discussion with Town of Devon, 2016). Devon was close to meeting the landfill waste reduction target in 2012. Comparison of Devon's annual landfill and compost waste generation is shown in figure 4.7. Figure 4.7 shows that in the year 2015 both landfill and compost waste generation was lower than the previous years.

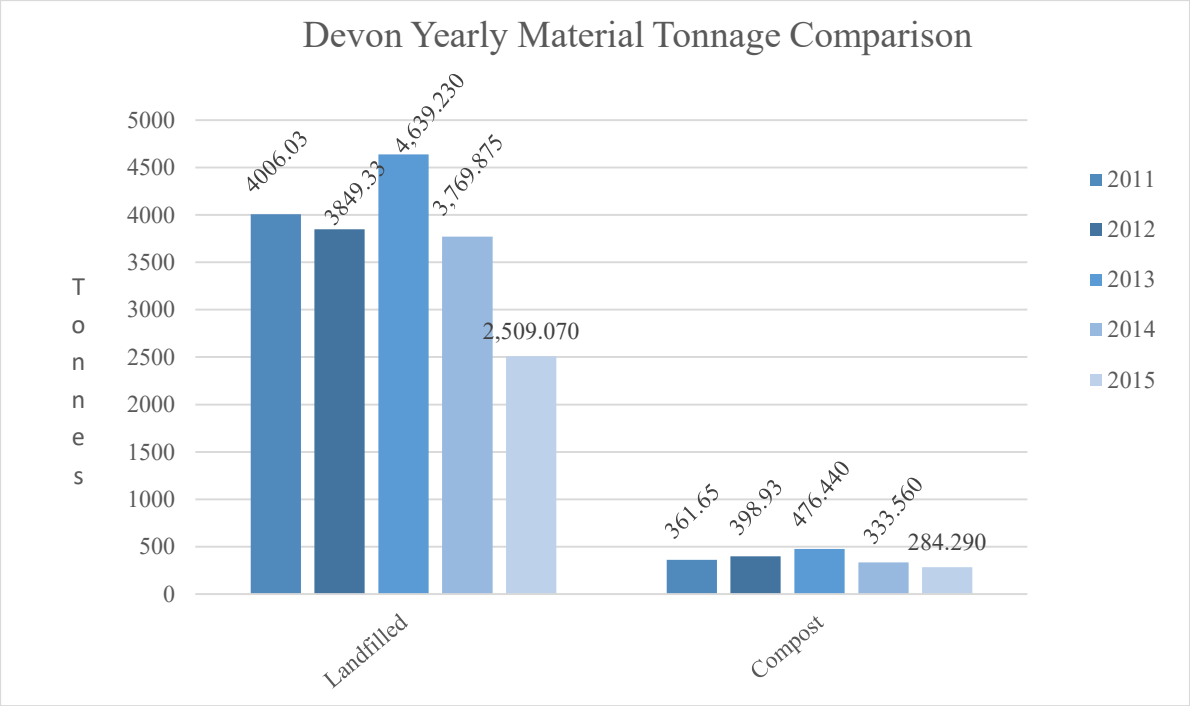

Figure 4.7: Comparison of Devon's annual landfill and compost waste generation
Source: Informal discussion with Town of Devon, 2016

4.4.1.2 Brownfields management

Devon does not have a comprehensive list of municipal brownfield sites (Informal discussion with the Town of Devon, 2016). The largest brownfield site in the municipality is old Imperial Oil Plant site. However, there are no reclamation efforts sponsored by the municipality occurring on any brownfield sites.

4.4.1.3 Ecological footprint of Devon

The ecological footprint of Devon for 2015 was estimated to be 21.49 global hectare/capita (Informal discussion with Tesselatte Inc, 2016). Compared to the 2015 footprint calculated for the City of Edmonton (7.6 global hectare/capita) it is evident that Devon has a significant ecological footprint (Informal discussion with the Tesselatte Inc, 2016).

4.4.2 Environmental conservation

4.4.2.1 Critical environmental areas

Environmental conservation practices in Devon are focused on the North Saskatchewan River valley conservation and improvement of the amenities for recreational purposes. Specific plans addressing the river valley management are River Valley Master Plan (2011), River Valley West Plan (1980), Devon Parks and Recreation Master Plan (2007-08), Parks, Recreation, and Culture Master Plan (1997, 2009), and the Devon Municipal Development Plan Consolidation (2012). The Devon River Valley Master Plan illustrates plans for development in the river valley for recreational purposes and erosion control measures.

4.4.2.2 Bike and pedestrian trails management

Bike and pedestrian trail management is a part of the environmental conservation policy initiatives in Devon. Devon's paved and multi-use trails accommodate both pedestrians and bikers. These trails are recreational in nature, but they also connect to major services and trip destinations (e.g. schools, places of employment).

4.5 Infrastructural domain of resilience

Indicators of infrastructural resilience are grouped under public investments and present level of infrastructure. Specific indicators of public investment and present level of infrastructure are expanded below.

1) Public investments: investments made for planned, under construction, and completed projects in last five years
2) Present level of infrastructure: available industrial lots, accessibility and capacity of local and regional transportation network, health and educational infrastructure, municipal facilities and communication network

4.5.1. Public Investments

Data on public investments in planned, under construction, and completed projects was collected from Alberta Open Data and Canada Open Data website (Alberta Government, 2015; Government of Canada, 2016). Major public investments have been made in the infrastructure and recreation sectors (Table 4.7). The largest project is the Capital Region River Valley Park – Connectivity phase, but the ultimate recipient of this project will be the River Valley Alliance formed by municipalities that share the North Saskatchewan River Valley.

Table 4.7: Public investment in large capital projects

Project Name	**Sector**	**Stage**	**Eligible cost (CAD)**	**Brief description**
Road Improvements - Devon	Infrastructure	Completed	3,782,616.00	Upgrade of local roads and sidewalks was completed in November 2011
Highway 19 Twinning	Infrastructure	Announced	80,000,000.00	Highway 19 and Highway 60 will be realigned to facilitate through movement via interchanges
Capital Region River Valley Park - Connectivity Phase	Recreation	Under construction	90,000,000.00	The ultimate recipient of this project would be River Valley Alliance formed by seven municipalities including Devon.
Wastewater treatment plant	Infrastructure (municipal services)	Under construction	28,000,000.00	The project is expected to be complete by June 2018. Devon's previous wastewater treatment plant operating agreement with AB Environment expired in 2015.

Source: Alberta open data, Canada open data, Devon Dispatch.ca, Town of Devon multi-modal transportation study 2013, The town of Devon river valley master plan 2011

4.5.2 Present level of infrastructure

This section presents Devon's level of infrastructure. This discussion examines the availability of industrial lots, transportation network, class size in schools from kindergarten to high schools, the capacity of the hospital, future municipal facility planning, and broadband internet connectivity for communication.

4.5.2.1 Available industrial lots

The Devonian Industrial lot is currently full; all 11 existing lots have been purchased. The Municipality is trying to secure 40 acres of un-serviced industrial land to ensure adequate

physical space for industrial growth (Informal discussion with Town of Devon, 2016). Until available industrial land is expanded, there can be no new industrial investment in Devon.

4.5.2.5 Transportation network

Devon has direct access to regional highways 19 and 60 and a network of internal roadways. After the proposed realignment of Highway 60 and 19, entrances to the town will decrease from five to two (Town of Devon, 2013). As a result, travel time and congestion are expected to increase. According to Devon's Multi-Modal Transportation Study (MMT), several street intersections have a lower level of service (LOS) indicating congestion may occur during peak hours. The MMT provides several alternative remedial options to increase the service at those points, implementation of which is subject to budget availability (Town of Devon, 2013).

4.5.2.2 Average class size

Devon's schools are in the Black Gold Regional Division No. 18. Average Class size according to grade grouping in 2014/2015 is listed in Table 4.8. The table shows that in 2015, larger class sizes are in grade 4 to grade 9 indicating that average class size in grade 10-12 will increase in the future.

Table 4.8: Average class size in public schools of Devon (Black Gold Regional Division no. 18)

Grade grouping	**Class size**
Kindergarten – Grade 3	18.2
Grade 4 – 6	22.7
Grade 7 – 9	22.8
Grade 10-12	12.20

Source: Black Gold Regional Division no. 18, 2015

4.5.2.3 Number of hospital beds and occupancy rate

The number and occupancy rates of available beds in the Devon General Hospital are examined to explore the inpatient care scenario. Per "A picture of health – 3year service plan - Devon &

Leduc" prepared by Alberta Health Services, Devon General Hospital has 24 beds. The same report states that in 2009/10 occupancy rate of beds in the hospital was 100.3%.

4.5.2.4 Priority municipal facilities

Priority municipal facilities identified for near-term and mid-term development in the Town of Devon facility development plan 2012 were the local RCMP hall, fire hall, municipal works shop and yard, outdoor rink, fisher arena, and public library. The existing outdoor pool is to be replaced by an indoor pool. Due to declining trend in population cohort 0-14 years, demand for preschool related land will decrease and there will be a higher demand for youth drop-in centers (Town of Devon, 2012a).

4.5.2.6 Communication

Broadband internet coverage in Devon was examined as an indicator of access to communication technology. According to the municipality, the entire town can be serviced by broadband internet but the costs of service to do so is not deemed affordable by the service providers at present (Informal discussion with Town of Devon, 2016).

4.6 Governance

This section presents secondary quantitative data and qualitative data collected from informal discussion to explore indicators under the heading of public participation in municipal governance and Municipal decision making and coordination process. Specific concerns under these headings are expanded below.

1) public engagement in municipal governance: voter turnout in municipal elections

2) Institutional decision making and coordination process: educational, health, transportation, industrial lot development, municipal development, waste management, environmental management, recreational facilities.

4.6.1 Public engagement in municipal governance

In 2010, the voter turnout rate in Devon was 31.87% and increased to 43.38% in 2013 (Table 4.10). The eligible voter base was similar in both the elections perhaps indicating an increase in public engagement in municipal affairs

Table 4.10: Town of Devon Official Election Results

	2010	**2013**
actual voter	1483	2017
eligible voter	4653	4650
Voter turn out (%)	**31.87**	**43.38**

Source: Government of Alberta - Municipal Affairs

4.6.2 Institutional decision-making and coordination

Decision making and coordination for municipal service delivery and capital development are important in resilience discussions providing insight into the Municipality's role and ability to ensure long-term resilience.

The responsibility of institutional decision-making and coordination of the issues affecting community resilience is shared between Devon and the Province (Informal discussion with Town of Devon, 2016). In the informal discussion with municipality of Devon following data on the institutional decision-making and coordination is derived. Investment in educational and health infrastructure is managed at the provincial level. The municipality is responsible for maintenance of transportation infrastructure within the jurisdiction, although investment for transportation comes from federal, provincial, and municipal sources. Industrial lot development and management were an initiative in Devon. Needs assessment and investment for municipal

development projects are primarily promoted and lobbied by the Municipality at the provincial and national level. The municipality is responsible for collection for residential wastes and the uses a regional landfill. The municipality is responsible for preservation and maintenance of critical environmental areas like river valley and urban green area conservation following the guidelines of Alberta Environment. It also makes the decisions about recreational facilities within the community.

Chapter 5: Results from content analysis of municipal and regional policy documents

5.1 Introduction

This chapter presents the findings from the qualitative content analysis of municipal and regional policy documents. The analysis was performed to determine the role of policy in regulating Devon's future resilience. Two indicators were examined to determine the role of policy: 1) Key economic, development, and environmental policies at the municipal and regional level related to resilience and, 2) Priority development areas marked within existing policies (e.g. economic growth, community, environmental protection, infrastructure and services, regional planning) (Table 5.1).

In this chapter, a list of key economic, development and environmental policies are listed in Table 5.1 along with key issues addressed. In the following sections, priority development areas marked in those policies are described under five major themes. The themes are derived from the content analysis of key municipal and regional development policy documents. Several subthemes are categorized under each theme. The major themes derived from content analysis are as following:

- Economic growth
- Community
- Environmental protection
- Infrastructure and services
- Regional planning

Key policies were reviewed and analyzed to determine the specific policy approaches that address economic, social, environmental, infrastructural and governance issues. The following policy documents were chosen for analysis based on their relevance to the objectives of this research (Table 5.1).

Table 5.1: List of key policy documents chosen for content analysis

Name of the policy document	**Key issues addressed**
Municipal Development Plan (2006)	• Supporting the roles of capital region growth plan • Economic growth (influenced by regional trend) • Tourism development • Downtown redevelopment • Land for future growth and development • Future corridor commercial uses • Light industrial development in Devonian business park • Growth of existing businesses • Better waste management
Devon Downtown Vitalization Plan (2010)	• Vitalize downtown businesses • Compact development • Develop downtown as the commercial and community core
Facility development plan (2012)	• Identify municipal facility type, projected timing for expansion or new construction and estimated capital costs
Multimodal Transportation Study (2013)	• Moving towards sustainable transportation modes • Promoting walking and bike as alternative mode of transportation • Impact of highway 60 and highway 19 realignments • Promote the vision of healthy and active community
Parks, Recreation and Culture Master Plan (2009-2014)	• Guideline for recreational development • Creating economic opportunities e.g. employment, attracting tourists and new residents

	• Improving quality of life
The Capital Region Growth Plan Growing Forward (2009)	• Economic growth • Strong community • Protection of environment and resources • Minimize regional footprint • Increased transportation choice • Efficient services
Town of Devon/ Leduc County Inter-Municipal Development Plan (IDP) (2011)	• Accommodation of future growth of Devon • Policies on future infrastructure and servicing • Joint approach to industrial development • Water development partnership
River Valley Masterplan (2011)	• River Valley conservation and improvement of its features for recreational purposes while preserving the environment
Integrated watershed management plan for the North Saskatchewan River in Alberta (2012)	• Manage watershed of North Saskatchewan river • Sustain water resources for the long-term

In the following section themes derived from content analysis of the above-mentioned policy documents are discussed in detail.

5.2 Theme- Economic growth

Economic growth was determined to be an important theme because it was a recurrent subject in the analyzed policy documents. Devon sets the future priorities for economic growth in the *Municipal Development Plan, Devon Downtown Revitalisation Plan, Parks Recreation and Culture Master Plan*, and the *Town of Devon/ Leduc County Inter-Municipal Development Plan*. Four sub-themes were identified: balanced growth, economic diversification, downtown revitalization, and recreational investments (Table 5.2).

Table 5.2: List of sub-themes under economic growth

Sub-themes	**Number of policy documents that addressed this sub- theme**
Balanced growth	5
Economic diversification	3
Downtown revitalization	3
Recreational investments	2

5.2.1 Balanced Growth

The first sub-theme of economic growth is balanced growth. Balanced economic growth is portrayed as growth which ensures both community development and environmental health. The *Capital Region Growth Plan* (2009) stated that economic growth would be ensured in the capital region while promoting strong communities and preserving the environment.

> *Co-ordinate decisions in the Capital Region to sustain economic growth and ensure strong communities and a healthy environment.* (The Capital Region Growth Plan Growing Forward, 2009)

Balanced economic growth aims to achieve higher non-residential tax base to improve employment opportunities. The *Municipal Development Plan* (2006) states that Devon's industrial and commercial tax base should be diversified for employment generation and strengthening the tax base. However, according to Devon's *Municipal Development Plan* (MDP), diversification of commercial and industrial tax base will not be promoted at the cost of the overall development of the community.

> *The Town desires to strengthen and diversify its commercial and industrial base in order to provide employment opportunities to local residents and to diversify its tax base.* (Municipal Development Plan, 2006)
>
> *The Town should strive to achieve a non-residential assessment between 15 and 25 per cent. Higher levels of non-residential development which would provide greater than 25% non-residential assessment if the proposed developed is not detrimental to the overall development of the community may be considered by the Town.* (Municipal Development Plan, 2006)

Devon's municipal policies do not focus on growth as an increase in non-residential tax base and employment opportunities solely, but also from a municipal facility planning perspective. In the *Facility Development Plan* (2012) Devon's municipality predicts the cost of municipal facilities in order to prepare for municipal growth and expenditure.

> *In response to this potential increase in demand for municipal services, the Town of Devon has sought to complete a New Facility Development Plan. By building upon its existing Facility Development Plan from 2006, The Town is seeking to anticipate the timing of capital costs for future municipal facilities. By doing so, the Town is acting proactively to plan appropriately for future municipal growth and expenditure. (Facility Development Plan, 2012)*

According to the *Inter-Municipal Development Plan* (2011), there are constraints on the available lands for Development in Devon. The plan suggests that there could be small parcels of land available for new industrial, commercial, and municipal facility development increasing the costs of future development. Unavailability of developable land may create demand for the land in the IDP (Inter-municipal development plan) area.

> *Therefore, although the Town appears to have large amounts of land available for development, the reality is that the variety of constraints on land within the Town's boundaries could result in only pockets of land being feasible for development. These constraints could make the cost of building in Devon higher than normal, slowing the pace of new growth, or creating demands on lands in the IDP area* (Inter-Municipal Development Plan, 2011)

5.2.2 Economic diversification

Economic diversification is identified as an important factor for the economic resilience of an RBC, and many studies are critical that the RBCs fail to do so (Freudenburg & Gramling, 1998; Halseth & Sullivan, 2004; Hayter & Barnes, 2015; Keough, 2015). In Devon's MDP (2006), the need to diversify commercial and industrial sectors and the municipal tax base is identified.

> *The Town desires to strengthen and diversify its commercial and industrial base in order to provide employment opportunities to local residents and to diversify its tax base. (*Municipal Development Plan, 2006)

> *The town continues to strive for more light industrial and commercial development, both in the downtown corridor and the business park* (Municipal Development Plan, 2006)

The MDP (2006) lists the following as potential sources of economic diversification: research industries, non-polluting manufacturing, tourism-related business, corridor commercial businesses, and regional contractors.

> *The Town [Devon] should continue to seek businesses, such as research-related industries, non-polluting manufacturing, tourism-related businesses, corridor commercial businesses, or regional service contractors, which could successfully locate within the community* (Municipal Development Plan, 2006)

Interestingly the *Downtown Vitalization Plan* (2010) states that the economic base of Devon is diversified, which is contradictory to the policy statements made in MDP (2006):

> *The Town's economic base is diversified* (Devon Downtown Vitalization Plan, 2010).

Additionally, within the IDP (2011) a potential site for industrial development is identified even though the town has limited developable land remaining within the business park:

> *With the loss of the Imperial Oil Gas Plant, which was a major source of tax assessment for the community, and the limited amount of developable land left in the existing Business Park, land for future industrial development in the IDP area is imperative to the long-term sustainability of the community*. (Inter-Municipal Development Plan, 2011)

5.2.3 Downtown revitalization

Policy directions for downtown revitalization emphasize its perceived importance to maintain economic growth. Downtown revitalization plans are closely related to the economic diversification initiatives. The *Devon Downtown Vitalization Plan* (2010) seeks to re-establish the downtown as the primary mixed-use service center for the community by combining the commercial, retail, and community service functions within the downtown core.

> *To establish the Downtown as the key commercial/mixed-use/community service centre of the overall community, focused around the commercial/retail activity on Athabasca Avenue and Huron Street* (Devon Downtown Vitalization Plan, 2010)

The viability of the downtown is considered in planning future commercial opportunities in the IDP growth areas (Inter-Municipal Development Plan, 2011). The types of commercial development planned for the IDP growth areas are highway commercial areas, a district commercial center, and neighborhood commercial nodes which are similar to the planned mixed-use service center in downtown. Hence the IDP policies state that commercial centers in IDP growth area will be limited so that the Downtown can flourish.

> *In contemplating potential future commercial opportunities in the IDP in the long term, the viability of downtown Devon will need to be considered in conjunction with a need for a diverse land use mixture in future growth areas. Three types of commercial development - highway commercial areas, a district commercial centre, and neighbourhood commercial nodes - have been considered as options to address potential future needs. The long-term intent of these commercial uses is to provide for the basic needs of future residents of the area, but also to be limited to an extent that will allow downtown Devon to continue to thrive.* (Inter-Municipal Development Plan, 2011)

5.2.4 Recreational investments

Recreational facility development is considered in RBCs as a viable option for industrial diversification and economic growth (Halseth & Sullivan, 2004). Devon has two recent policy documents *The Parks, Recreation and Culture Master Plan* (2009-2014) and the *River Valley Master Plan* (2011) for guiding recreational development in the Town. According to Devon's *Parks, Recreation and Culture Master Plan* (2009-2014), recreational and cultural facility development are an important factor to increase the community's resilience. Recreational facilities are considered assets in the master plan to attract future residents and businesses. Additionally, recreational investments are deemed important for reviving the economy. Such programs and facilities are expected to provide full time, part-time, and seasonal employment opportunities.

> *It is arguable that the recreational/cultural opportunities and park settings within the town are some of the community's biggest assets that potentially assist in attracting new residents and businesses*. (Parks, Recreation and Culture Master Plan 2009-2014)
>
> *The investments made by the town towards recreation amenities and programs help provide the community with powerful economic generating tools*. (Parks, Recreation and Culture Master Plan 2009-2014)
>
> *Employment opportunities for all ages: fulltime, part-time and seasonal jobs are generated through cultural and recreational programs and facilities* (Parks, Recreation and Culture Master Plan 2009-2014)

In the recreational policies of Devon, financing mechanisms for recreational development and improvement are discussed. According to the *River Valley Master Plan* (2011), funding is set aside by the municipality annually for the development and improvement of Devon's recreational facilities and is coupled with provincial and federal grants. Devon will have to set aside funds for reinvesting in capital projects for recreational facilities in future since each facility has to be rebuilt or renovated after specific a time period (River Valley Master Plan, 2011). Along with establishing a separate budget for a capital investment of recreational facilities, the municipality also considers setting up local partnerships with service clubs and encourage community engagement (River Valley Master Plan, 2011).

> *The Town of Devon budgets approximately $50,000 annually to develop and improve recreational facilities and park amenities by leveraging additional funds through various provincial and federal recreational grants as they become available. Most capital projects have a maximum of 30 years. Accordingly, capital should be set aside by the Town of Devon for reinvestment*. (River Valley Master Plan, 2011)
>
> *To implement the Master Plan, the Town should establish an annual budget for implementation of the elements of the Master Plan and should also cultivate partnerships with groups such as service clubs as a way to engage the community and leverage local investment*. (River Valley Master Plan, 2011)

5.2 Theme- Community

The second theme that emerged from municipal and regional policies was 'community.' This theme is important to analyze Devon's past and future social characteristics and community

identity per the municipal and regional policies. Four sub-themes were identified: history (e.g. Devon's socio-economic characteristics during the initial development), residential community (Devon's present and future characteristics as a residential community), population growth (e.g. role of population growth in community planning), and community interaction (e.g. increasing community-based events and community engagement) (Table 5.3).

Table 5.3: List of sub-themes under community development

Sub-theme	**Number of policy documents that addressed this sub- theme**
History	2
Residential community	1
Population growth	3
Community interaction	3

5.3.1 History

Devon's long-standing self-identification as a resource-based community (RBC), specifically as an oil and gas community, can be illustrated with municipal documents like the IDP, 2011. In the 2011 IDP, the history of Devon's initial development as a town for accommodating the workers in the oil and gas industry is described.

> *The Leduc No. 1 oil strike gave Devon its start, as it was necessary to find living quarters and accommodation for workers who were to be employed in the oil fields. Imperial Oil chose a picturesque spot southwest of Edmonton, which was bound on two sides by the North Saskatchewan River, for the development of a town for its workers. They were able to purchase approximately 50 acres of what was then a barley field, and this became the site of the future Town of Devon.* (Inter-Municipal Development Plan, 2011)

The IDP also states that Devon was a comprehensively planned model town. The town was developed as a model town by Devon Estates with the guidance from provincial government town planning commission. Devon was the first community in Canada that was vetted by the regional planning commission (Inter-Municipal Development Plan, 2011).

> *Devon was labeled as Canada's Model Town, since it was the first community in all of Canada to be approved by a Regional Planning Commission.* (Inter-Municipal Development Plan, 2011)

5.3.2 Residential community

According to the municipal policies, Devon is a residential community will remain as a low-density residential community in future. Considering the residential history of Devon, the town's policies ensure a continuation of its primarily residential status. According to Devon's Municipal Development Plan (2006) Devon is a residential community for the surrounding urban center of the City of Edmonton, the community of Nisku and Acheson Industrial Parks, and the Edmonton International Airport (Municipal Development Plan, 2006). The MDP states that the future vision of Devon to remain a low density, single family, residential community.

> *Overall, Devon remains a low density, single-family residential community, providing a variety of housing styles for families, senior citizens, young couples and others.* (Municipal Development Plan, 2006)

5.3.3 Population growth

Rapid population growth during economic booms adds pressure on municipal services and facilities in RBCs (Halseth & Sullivan, 2004; Keough, 2015). Policy guidelines for municipal facilities planning consider the population growth rate over time. In Devon's Facility Development Plan (2012), a medium population growth rate (3.5% per year) was considered for a needs assessment. However, the recent capital region population forecasts declared a lower annual population growth rate of 1.3% till the year 2031 in Devon (Facility Development Plan, 2012).

> *Town of Devon's currently preferred projection – the Medium Projection from the MDP – employs an average annual growth rate of 3.5%, and yields a 2031 population projection of approximately 14,900 persons. The more recent Capital Region projection envisions a much lower rate of growth, averaging 1.3% per annum, and yielding a 2031 population projection of approximately 8,800 persons.* (Facility Development Plan, 2012)

Resource-based communities experience variable socio-economic characteristics during cycles of economic boom and bust and during rapid population growth rate (Petrova & Marinova, 2013). In the 2012 Facility Development Plan, Devon's population growth and aging population is discussed with the possible impact on demand for municipal services. The plan states that facilities need to be planned according to the changing demographic character. The plan also described it would put the burden on Devon's capital investment plan and operation costs of municipal facilities.

> *Devon has experienced moderate population growth in recent years. Because of this growth and population aging, and because of the age and condition of some municipal facilities, the extent and type of demand for municipal services is expected to change, including municipal operational, social/cultural, and recreational/leisure services. Accommodation of this demand for such a diverse range of community services will entail a substantial burden for the Town of Devon – both in terms of capital investment and ongoing operating costs.* (Facility Development Plan, 2012)

5.3.4 Facilitation of community interaction

In RBCs, increased community engagement has been found to improve local morale during boom and bust periods (Petrova & Marinova, 2013). Devon's municipal policies highlight initiatives to facilitate community interaction.

In Devon's *Parks, Recreation and Culture Master Plan* (2009-2014), financial and logistic support for organizing community events (e.g. Devon Days, garage sale, and business fair).

> *Devon Days is the most well-known event for the community and contributes both economically and enhances community pride. For these reasons the town currently supports the Devon Exhibition Association by providing: A grant that is determined yearly as part of the budget process, Free rent on arena and community centre, Free use of road barricades, Assistance from community services department where possible, Organization of the kick off BBQ. In partnership with the chamber of commerce, the economic department assists with the town-wide garage sale and business fair.* (Parks, Recreation and Culture Master Plan 2009-2014)

The Devon Downtown Vitalization Plan (2010) envisions a mixed-use of commercial and community services to help revitalize the area. The downtown is envisaged as the community service center with commercial and retail activities at the center of attraction.

> *To establish the Downtown as the key commercial/mixed-use/community service centre of the overall community, focused around the commercial/retail activity on Athabasca Avenue and Huron Street*. (Devon Downtown Vitalization Plan, 2010)

In addition to improving the downtown area, recreational opportunities have been identified as an asset to attract new residents and businesses. It is also a method to reduce costs associated with social issues and promotion of healthy lifestyles (Parks, Recreation and Culture Master Plan, 2009-2014).

> *The parks and recreation assets of the town help promote healthy community lifestyles. This in turn helps ensure residents can live longer in their own homes and continue to invest in local services, as compared to living in an institutional setting. Further, investment in recreational assets helps reduce costs related to many health and social issues seen in a community*. (Parks, Recreation and Culture Master Plan 2009-2014)

5.4 Theme- Environmental Protection

The third theme derived from the content analysis is environmental protection. This is an important theme to understand the Municipality's environmental priorities. Three policy documents addressed the theme of environmental protection.

As previously discussed, Devon was developed as a result of Leduc No. 1 oil well site. Non-renewable resource extraction is not considered as sustainable according to the strong sustainability school of thought (Martinez-Fernandez et al., 2012; Zarsky & Stanley, 2013). The strong sustainability school of thought emphasizes that any activity that exhausts earth's non-renewable resources are incommensurable. Municipal and regional policies analyzed for this study showed that the town's authority is taking a strong sustainability approach while making a decision on new industrial ventures in Devon. Devon's MDP (2006) indicates that the

municipality was not interested in new heavy industries that carried potentially negative environmental or societal impacts.

> *New heavy industry, which is capable of having a detrimental effect on humans or the environment through the discharge or emission of toxic, noxious or hazardous products beyond the boundaries of the site, will not be considered*. (Municipal Development Plan, 2006)

The municipal authority also aims to minimize the impact of tourism and recreational activities on the river valley's natural resources (Municipal Development Plan, 2006). For example, the MDP acknowledges that North Saskatchewan River Valley is under a provincial restricted development regulation. Any changes in the surface of river valley must meet the provincial government criteria and the town's 2011 *River Valley Master Plan* requirements (Municipal Development Plan, 2006).

> *The North Saskatchewan River is recognized at the provincial and regional levels as a significant environmental and recreation resource. As a result, all land within the North Saskatchewan River Valley has been placed under a provincial restricted development regulation (Edmonton-Devon Restricted Development Area - R.D.A.) which controls the level and type of development (See Map 6: Protected Natural Areas). Any subdivision or development involving surface disturbance is subject to review and approval by the provincial government prior to approval by the municipality and should meet the requirements of the Town of Devon River Valley Master Plan.* (Municipal Development Plan, 2006)

These above-stated policy guidelines complement the goal of the Integrated Watershed Management Plan (2011) to reduce the impacts on the watershed and promote responsible recreation in the river (Integrated Watershed Management Plan for the North Saskatchewan River in Alberta, 2012).

> *Minimize and reduce individual impacts on the watershed (on the land and in water) by practicing and promoting responsible recreation in the North Saskatchewan River watershed*. (Integrated Watershed Management Plan for the North Saskatchewan River in Alberta, 2012)

5.5 Theme- Infrastructure and services

The fourth theme to be analyzed is infrastructure and services. This theme is important to analyze to be able to understand the future infrastructure and services planned for Devon *and* the adequacy of the town's assets at present. The sub-themes identified under this theme are accessibility and connectivity, multimodal transport, and expansion of services (Table 5.4).

Table 5.4: List of sub-themes under infrastructure and services

Sub-theme	**Number of policy documents that addressed this sub- theme**
Accessibility and Connectivity	2
Multi-modal transportation	1
Expansion of Services	5

5.5.1 Accessibility and Connectivity

Resource-based communities often suffer from a lack of investment in public infrastructures resulting in inadequate levels of accessibility (Bhattacharyya & Collier, 2013). Devon has access to regional highways and internal road networks including pedestrian and bike trails. According to Devon's 2013 Multimodal Transportation Study (MMT), the municipality has access to Highway 60 and 19. The MMT also indicates that realignment of the highways will affect Devon's existing traffic pattern and suggest construction of interchanges. Existing transportation network within Devon is strong except the north/south connectivity for cyclists (Multimodal Transportation Study, 2013).

> *future access to the Town will be controlled through the construction of two interchanges with the realignments of Highways 60 and 19. Significant changes in the existing traffic patterns within Devon will result from the completion of the realignments*. (Multimodal Transportation Study, 2013)

> *The existing network connectivity in Devon is strong in most places, especially for recreational purposes. Stakeholders and the public expressed concerns regarding the lack of north/south connectivity, east of Highway 60, especially for cyclists*. (Multimodal Transportation Study, 2013)

The Inter-Municipal Development Plan outlines plans for transit network development for Devon and the surrounding areas with currently low ridership capture opportunities. Future transit services would likely be a bus network connecting Devon and the IDP area with other economic centers (Inter-Municipal Development Plan, 2011).

> *The Transit Network Plan includes Devon and the surrounding IDP area in the „Exurban Zone". This Zone includes areas that are physically detached from the main city of a metropolitan area, and involves stretches of travel with little or no transit ridership capture opportunities. Future transit service in these areas would generally be restricted to coach-style buses providing connections to other population or employment centres that would be served by transit* (Inter-Municipal Development Plan, 2011)

5.5.2 Multi-modal transportation

Multi-modal transportation systems are encouraged in Devon's transportation policy. Devon's MMT policy states that a goal for the municipality is to improve walking and biking trails within the city and work towards integrating these transportation modes with vehicular traffic (Multimodal Transportation Study, 2013).

> *While acknowledging that the car will remain a prominent means of transportation, the Town recognizes that walking and bike will play increasingly important roles* (Multimodal Transportation Study, 2013)

Additionally, Devon also envisions promoting its identity of Bike Town Alberta and considers it as forward thinking (Multimodal Transportation Study, 2013).

> *It is forward thinking for the Town to initiate this study beyond the norm and will strengthen the Town's vision of becoming – Bike Town Alberta* (Multimodal Transportation Study, 2013)

5.5.3 Expansion of services

Devon's Facility Development Plan (2011) describes the demand for community facilities and services in the immediate, mid- and long-term time frames. According to this document, Devon

will have increased demand for youth drop-in centers but lower demand for pre-school spaces as population growth rate change (Facility Development Plan, 2012).

> *As described, low population growth trends, particularly amongst young children suggest declining use of the pre-school and related spaces in Town. However, the youth drop-in centre is expected to see increased demand in the mid-term from 2017 – 2021. All other facility-based demand is expected to be well accommodated within current locations well past the mid-term.* (Facility Development Plan, 2012)

In accordance with the Parks, Recreation and Culture Master Plan 2009-2014, Devon's changing demographic trend may increase the need for services targeted towards the senior citizens.

> *As the demographics of the community change so may the needs of seniors. It is important that the Town of Devon continue to work with the community in providing services that ensure healthy activities for seniors* (Parks, Recreation and Culture Master Plan 2009-2014).

Devon's future demand for municipal services will depend on the demographic trends and the policy guidelines point out the change in that.

5.6 Theme- Regional Planning

The fifth sub-theme identified was regional planning. Regional planning is important to analyze to identify how Devon's internal policies interact with the related regional trend(s). Sub-themes identified under regional planning are long term strategies and government arrangement (Table 5.5).

Table 5.5: List of sub-themes under regional planning

Sub-theme	**Number of policy documents that addressed this sub- theme**
Long-term strategies	3
Governance arrangement	2

5.6.1 Long-term strategies for regional planning

Devon is one of the communities within the Alberta Capital Region (The Capital Region Board, 2009) and its' policies acknowledge the Capital Region Growth Plan. The Capital Region

Growth Plan states that it will encourage integrated approaches for regional planning (The Capital Region Board, 2009)

Relatedly, the Inter-Municipal Development Plan (IDP), for the town of Devon and Leduc County, states that the establishing long-term development policies (i.e. over 50 years) are a primary objective.

> *The IDP is based on population and development projections using a base year of 2009. It is intended to guide development activity in the identified area and to provide both short and long term policy direction from its completion in 2010 until 2060 (a 50-year planning horizon). This Plan shall be re-evaluated every five (5) years to ensure that it continues to reflect the Town's and the County's objectives for the future development in the IDP area*. (Inter-Municipal Development Plan, 2011)
>
> The two parties of IDP (Devon and Leduc County) will develop an IDP liaison committee once the IDP is adopted by the councils. *The respective Councils of the Town of Devon and Leduc County shall establish the IDP Liaison Committee upon the adoption of the IDP, through a joint agreement*. (Inter-Municipal Development Plan, 2011)

Additionally, the IDP incorporates the objectives of the Integrated Watershed Management Plan (year) for North Saskatchewan River and the strategic goals of Water for Life: for Alberta's Strategy for Sustainability (2008) (Inter-Municipal Development Plan, 2011). Consistent with the IDP, Devon, and Leduc County will jointly decide on water supply services in the IDP area in future.

> *Town and the County have developed a Water Development Partnership framework, which will guide the two municipalities in establishing formal agreements on how water supply could be addressed for the area in the future*. (Inter-Municipal Development Plan, 2011)
>
> *This Integrated Watershed Management Plan lays out recommendations and an approach to manage the North Saskatchewan River (NSR) Watershed, sustain water resources for the long-term and meet the three strategic goals of Water for Life: Alberta's Strategy for Sustainability (2003). (Integrated Watershed Management Plan for the North Saskatchewan River in Alberta*, 2012)

Devon is a member of the River Valley Alliance for the North Saskatchewan River. Hence, long-term planning strategies include a joint vision for river valley parks network by the North Saskatchewan River (Inter-Municipal Development Plan, 2011).

> *River valley park space in Devon serves as the western terminus of the proposed Capital Region River Valley Park system that has been developed by the River Valley Alliance. Both the Town and County have endorsed this long term vision for the enhancement of the North Saskatchewan River Valley parks network*. (Inter-Municipal Development Plan, 2011)

5.6.2 Governance arrangement

Local governments in RBCs often suffer from lack of resources to provide services (Cheshire et al., 2014). One way of managing this issue is co-management among government sectors (Haslam Mckenzie, 2013). Devon has a policy framework for cost sharing with other municipalities in the Capital region of Alberta. As per the Capital Region Growth Plan (2009), the Capital Region Board requires the sharing of costs related to regional projects amongst the participating municipalities.

> *Implement policies for the sharing of costs among the participating municipalities for regional projects of the Capital Region* (The Capital Region Growth Plan Growing Forward, 2009)

Devon also has an inter-municipal policy with the Leduc county that states that Devon and Leduc County must establish a liaison committee for projects undertaken in the IDP area. This indicates that the councils of Devon and Leduc county can work together on issues related to IDP growth area.

> *The respective Councils of the Town of Devon and Leduc County shall establish the IDP Liaison Committee upon the adoption of the IDP, through a joint agreement.* (Inter-Municipal Development Plan, 2011)

5.7 Summary of findings from policies

The summary of findings from the content analysis of policy documents indicates that Devon's local policies are shifting towards a more resilient growth path. The policies emphasize the need for diversification in the economic sector and municipal tax base. The policies also advocate for community development through increased social interaction, municipal service development for changing demographic structure, and new industrial investment with lower negative environmental impact. The policies also encouraged regional cooperation between Devon and Leduc county through coordinated planning and cost sharing for future municipal services.

Chapter 6: Discussion and Study Limitations

6.1 Introduction

This chapter discusses the results presented in chapter four and chapter five and situates these findings within the existing literature discussed in chapter two. The results from chapters four and five were independent in some ways while interdependent in others.

The discussion is organized into two sections: 1) Devon's regional economic resilience as illustrated by factors identified in the analytic framework (analyzed by quantitative and qualitative data) and 2) The ability of governance to affect the achievement of resilience in Devon (determined from policy content analysis). Before moving on to the discussion, the research questions and the objectives set to answer those questions are reiterated here.

This thesis will use The Town of Devon as a case study to answer the following questions

1. What role do the economic, social, environmental, infrastructural, and governance factors have in making a resource-based community in Canada more or less resilient?
2. How do government policies influence resilience in economic, social, environmental, and infrastructural domains within a Canadian resource based community?

These research questions will be answered by the two following objectives

1. To develop a conceptual analytic framework to evaluate regional economic resilience of a resource-based community
2. To assess economic, social, environmental, and infrastructural forms of resilience and role of governance from publicly available archived quantitative and qualitative data based on the developed analytic framework

3. To identify priority development areas of municipal and regional policy documents through content analysis and assess the role of governance in directing the regional economic resilience of Devon

6.2. Devon's regional economic resilience as illustrated by factors identified in the analytic framework

6.2.1 Economic factors of resilience

In the federal census period 1991-2006 considered for this study, Devon experienced an increase in total employment (1510 new jobs). The increased number of jobs is likely a result of the economic boom experienced within Alberta during that time corroborating previous findings (Emery & Kneebone, 2013; Keough, 2015). Throughout the census period considered in this study, mining and oil and gas industries have continued to be a major source of employment in Devon's economy. Employment in science and technology related occupations have increased in absolute value. However, science and technology based occupation growth were positively correlated with the growth of employment in the mining, quarrying, and oil well industries (coefficient value of 0.599). Data analysis showed that employment in manufacturing, wholesale, health and social services and education industries sectors steadily declined from 1996-2006. This finding is relatable to the outcomes from studies of resource-based economy typically described as over-dependence on the mining sector and shrinking of manufacturing industry (Auty, 2001; Robertson & Blackwell, 2014). One possible explanation for the decline in health, social services, and education industries is the expenditure cuts of social services and health services at the national and provincial level the mid-1980s to mid-1990s (Soucy & Wrobel, 2000). However, amid an economic boom based on oil price surge in 2001 and 2006 the highest percentage of employment was in the retail sector instead of the mining industry. The Imperial

Oil Gas plant closed in 2006, and it would be interesting to explore how that has influenced employment distribution in Devon once the 2015 federal census data is released (CBC News, 2006).

In Devon, many of the new business licenses issued from 2009 to 2014 were for resident commercial and home occupation businesses. A study examining the regional economic resilience of Turkish provinces showed that during recessions, self-employed entrepreneurs have little capacity to adapt to shocks. Hence it might negatively impact the economy (Eraydin, 2016). The taxable assessment of properties has increased from 2015 to 2016, but the largest share is from residential and farmland properties. Devon's municipality may face difficulty to balance between revenue from commercial, industrial land use and service expenditures for residential land use in future.

6.2.2 Social and demographic factors of resilience

Federal census data (1991-2006) illustrates that the net population increased by approximately fifty percent. The growth of the population was consistent with population growth during resource-based economic booms (Halseth & Sullivan, 2004; Keough, 2015). There was not any significant change in population mobility. Percentage of residents who lived in the town for five years or more declined slightly in 2006, which is consistent with the sharp rise in Devon's population in the 2001-2006 census period. Devon has experienced a slowing growth rate of young children, and the MDP states that young single adults will keep leaving the town for education and employment opportunities (Town of Devon, 2012b). Increased income levels are consistent with an increase in median income experienced during resource booms (McKenzie & Rowley, 2013). In the census period from 1996-2006 average personal income per capita and average private household income were doubled. The ownership of private dwelling increased in

the same census period. This finding contradicts the anticipated housing crisis that follows resource boom in related literature (Halseth & Sullivan, 2004; Keough, 2015).The growth in population, home ownership, and income is consistent with the resource boom of 1997-2007 in the province of Alberta even though Devon's local gas plants shut down at the time (CBC News, 2006; Emery & Kneebone, 2013; Keough, 2015).

Under the human capital development sub-dimension, high school completion rates were found to be higher than the provincial rate in 2014 (Black Gold Regional Division no. 18, 2015). Percentage of people with post-secondary education especially people with a university degree or diploma increased. However, Devon's post-secondary attainment rate (10% of the population aged 15 or over) was much lower than the national rate that is 6 out of 10 adults (aged between 25 to 64) had some post-secondary qualification in 2006 (Statistics Canada, 2009). The finding corroborates previous findings that there is a low education attainment in resource-based communities in Canada and Australia (Lawrie et al., 2011; Martinez-Fernandez et al., 2012). The percentage of the population aged fifteen or over with a trade certificate decreased at the same time. The fall in the proportion of people with trade certificate can either be a result of local gas plants closure or a result of the rise in population with university degrees.

There are in total 49 active community organizations in Devon, and the Devon general hospital has an estimated number of 130-140 staffs in 2016 including all support services (Informal discussions with the Town of Devon, 2016). It appears, even though employment in health and social services fell in the 1991-2006 census period, recently Devon has seen improvement in the level of access to these services. This results showed that Devon has commendable access to health services and community-based organizations which are found as key factors to attract residents and businesses in RBCs (McKenzie & Rowley, 2013).

6.2.3 Environmental factors of resilience

According to the informal discussion with the municipality, Devon was close to achieving the landfill waste target in 2012. The municipality does not have a comprehensive list of brownfield sites and the ecological footprint of Devon for the year 2015 was estimated to be 21.49 hectare/capita (Informal discussion with the Town of Devon). These findings indicate that high level of growth in employment, income, home ownership rate and the population was not accompanied with an equally effective environmental management practice. This result is similar to the findings from the study on the resilience of Italian regions that industrial and recreational centers had critical environmental concerns (Graziano & Rizzi, 2016).

Devon has evidence of strong environmental conservation policies compared to environmental management indicators. For example, several policies are focused on river valley preservation and improvement of its features for recreational purposes while preserving the environment. This finding is comparable with findings from the study on Italian regions that environmentally vulnerable regions had more preventive policies (Graziano & Rizzi, 2016). Devon's paved trails and multi-use trails accommodate both pedestrians and bikers. The increase in recreational use of river valley park and trails system may cause anthropogenic pressure on the river valley's ecosystem and increase ecological footprint too.

6.2.4 Infrastructural factors of Resilience

Data of public investments in planned, under construction and completed projects, collected from Alberta open data and Canada open data show infrastructural projects in Devon were for transportation, recreation, and municipal services sector. Adequate access to transportation infrastructure is considered as essential for economic resilience (Graziano & Rizzi, 2016). Devon

has access to transportation network but proposed infrastructural projects will also negatively affect the access to regional highways from Devon in some points.

The Devonian industrial park all lots are sold, and the municipality is trying to secure and develop industrial land to ensure that the town has physical space for industrial growth (Informal discussion with the Town of Devon). At present, the town has no scope for industrial expansion. It can also be related to the fact that since 2009 to 2014 all the new business licenses were issued for resident commercial and home occupation businesses.

Ensuring access to adequate infrastructure and facilities is crucial for the resilience of RBCs (McKenzie & Rowley, 2013). Devon has access to the transportation network, and recreational facilities and it has planned for community facilities for next two decades. Devon's municipal authority is planning its facilities in a demand-driven manner. However, investing in infrastructures and facilities like educational institutions or health services is not within its jurisdiction.

6.2.5 Governance factors of resilience

Voter turnout in municipal elections in 2013 (43.38%) increased from 2010 (31,87%) and the eligible voter base was similar in both the elections. Devon's voter turnout rate in 2013 was lower than both the 2015 provincial election in Alberta (56.74%) and the federal election (66.1%) (Elections Alberta, n.d.; Elections Canada, 2016). However this rate was higher than that in the 2013 Edmonton Municipal election (34.5%) (Ramsay, Kozicka, & Slav, 2013). The turnout rate is important because as research has found that that voter participation rates are higher in socio-economically resilient communities (Osth et al., 2015). Also, a study on a Canadian RBC demonstrated that community involvement in municipal affairs had a positive impact on resident retention (Martinez-Fernandez et al., 2012).

The municipality has an important role in service delivery. However, the municipality has limited or no power to make decisions on important factors of resilience such as investing in secondary and post-secondary educational institutions, transportation infrastructure and community facilities that are capital-intensive facilities. The municipality is primarily accountable to its residents for the resilience of Devon, but it is unable to make decisions and investments for critical factors of resilience. Similar findings are also found in the studies in RBCs of Australia, New Zealand and Canada (Cheshire et al., 2014).

6.3 The ability of governance to affect the achievement of resilience in Devon (determined from policy content analysis)

6.3.1 Economic growth

Increased growth is one of the stated goals of Devon's MDP. However, it also states that it should be accompanied by a diversification of the economic sectors and growth will not be promoted at the cost of the environment or the overall development of the community. Policy statements set goals to minimize the effects of the staples trap (discussed in Chapter 2) and securing weak sustainability principles (Hartwick, 1977; Hayter & Barnes, 2015; Martinez-Fernandez et al., 2012; Watkins, 1963; Zarsky & Stanley, 2013). The municipal policies prioritize environmental conservation and development over economic growth. However, there is inconsistency in the policy documents MDP (2006) and the Downtown Vitalization Plan (2010) over whether Devon has a diversified economic base or not. Even though in some of the policies the need for economic diversification is identified, it is not possible to say whether policy directions have been acted upon because of the absence of federal census data since 2006. Studies on RBCs have shown that there is a gap between the identification of the need for economic diversification and initiatives made for it (Halseth & Sullivan, 2004). Comparison of

the policy findings with the findings from census data analysis also shows that there is a gap between the policy goals and experience. Policy guidelines for diversification include light industrial and commercial development rather than the fast-growing service sector or manufacturing industries. According to the Staples Trap Model, RBCs fail to reinvest resource rent in the fast-growing service sector or manufacturing industries (Auty, 2001). Devon's recreational investment plans and policies is an indicator that the municipal authority is trying to take advantage of its unique geographical location. This approach is very similar to what Halseth and Sullivan (2004) refer to as flexible adoption of opportunities for economic diversification and restructuring.

6.3.2 Community development

Devon's 2006 MDP and IDP state that Devon will continue as a low-density residential community with a medium to lower population growth rate. Reduced rates of population growth is a common phenomenon in mining towns after mine closure (Halseth & Sullivan, 2004). This policy statement is compatible with the economic restructuring in Devon after the shutdown of the Imperial Oil site. However, the provincial oil and gas industry may continue to have a significant influence on Devon's future economic sectors and demographics. Recreational opportunities have been identified in the Downtown Vitalisation Plan as a way of increasing community interaction, attracting residents and businesses. In this case, municipal policies aim to make flexible adoption of opportunities by planning recreational facilities as a way of community planning and development (Halseth & Sullivan, 2004; Martinez-Fernandez et al., 2012). Recreational facility development may also contribute to the social resilience of the town because a study on the resilience of Italian provinces showed that better access to leisure and community facilities makes regions more resilient (Graziano & Rizzi, 2016). The quantitative

data analysis also shows that there is a good number of community organizations in the town supporting the policy guidelines.

6.3.3 Environmental protection

Devon's MDP states that no new heavy industries with potentially high environmental impact will be considered and recreational facilities development will consider the impact on the river valley's ecosystem. Local development policies are leaning towards sustainability principles for planning new economic opportunities and municipal facilities (Martinez-Fernandez et al., 2012; Town of Devon, 2012b; Zarsky & Stanley, 2013). However, this policy shift was not mirrored in the quantitative data analysis of environmental indicators.

6.3.4 Infrastructure and Services

Devon's Multi-modal Transportation Plan aims to increase pedestrian and bike access to improve accessibility and connectivity and to attract future residents. The transport policy is designed to use site planning and neighborhood design ideas for future sustenance of the town, a strategy that has been in use across Canadian resource towns since the 1960s (Halseth & Sullivan, 2004). Devon's facility plans indicate acknowledgment of the changing demographic pattern of the town in response to changing the economic structure and planning municipal services accordingly. RBCs are considered to be lacking in services and infrastructure during the economic boom and during bust social and health services get cut down (Keough, 2015). Facility development plan indicates that Devon's municipality is aiming to cater for the future needs of services and infrastructure. The approach of facility development can contribute to the resilience of Devon as studies showed improved accessibility of transportation network and better access to health, education and social infrastructures increase the resilience of places (Graziano & Rizzi,

2016; Osth et al., 2015). The quantitative data analysis showed that investments are being made in the transportation, recreation and municipal services sector which is unlikely for a RBC.

6.3.5 Regional planning

Regional planning policies such as the Capital Region Growth Plan and Inter-Municipality Development Plan state that Devon should develop long-term integrated policies with the surrounding county and/or municipalities, and share the cost of development initiatives where possible. These policy directions may prove to be helpful for overcoming the challenge of lack of resources for capital investments often faced by local governments in RBCs (Cheshire et al., 2014). The regional and municipal policies, express an optimistic view about continued growth based on resource extraction with no consideration of economic busts. Which is consistent with the findings from Eraydin's study on Turkish region, that is regional policies do not account for recessionary shocks happening at the state level or global markets (Eraydin, 2016).

6.4 Limitations

This study was exploratory and instrumental in nature. Research methods and data collection processes have been reflected throughout the research to ensure validity and confirmability. This study had few limitations, but those do not affect the validity of the conclusions. However, the chosen study area and timeline of research had provided certain angles in the findings and the conclusion.

Federal census data was only available until the year 2006. In 2011 census data on economic and social resilience indicators considered for this research was collected through a household survey. To maintain methodological integrity from 1991-2006 census period was considered. However, that led to a gap between the findings from federal census data analysis and policy

content analysis, as the analyzed policies were developed after 2006. There was no scope to explore the impacts of the policies on regional economic resilience through quantitative data analysis. The Imperial Oil plant was closed in 2006 which may have some significant impact particularly on the economic and social resilience of Devon. Unavailability of census data since 2006 prohibited to explore the impact of plant shut down on Devon's resilience.

Another limitation of this study was that only one study area was looked into. Devon is a characteristic resource-based town. However, it is also located near Edmonton, the North Saskatchewan River Valley, and regional freight and transportation networks. These spatial aspects influence Devon's resilience in this region. An RBC which is remotely located and with limited access to regional centers may have very different resilience outcome compared to Devon. Thus, there is a limitation on the transferability of the results to other resource-based communities. Perhaps, had additionally case studies been included in the study results may be more generalizable.

A third limitation of the study was presence of external funding agencies that is Mitacs an Tessellate Inc. in the research process. However, at no point the funding organizations made any interference in the research process.

6.5 Recommendations for future study

This research has highlighted the need for future studies:

1. This research shows that Devon has a relatively low rate of post-secondary educational attainment among the population aged fifteen or over which is consistent with studies on resource-based communities around the world. Also, the municipal authority has no executive decision-making authority for post-secondary education opportunities. A lack of a skilled labor force may possess challenges for innovation and economic diversification in the community.

Further research may examine how educational attainment can impact economic diversification of an RBC and this may inspire studies examining how the local government can be involved in the process of increasing educational attainment.

2. Since this research only analyzed federal census data till 2006, a new study may be commenced on the impact of regional and municipal policies since 2006 using the 2015 federal census data. The study may also examine how the ongoing oil price crisis and economic downturn happening since 2014 have affected the regional economic resilience of Devon.

3. It is already mentioned in the limitations section that a multiple case study would increase the generalizability of findings. A multiple case study which applies the developed analytic framework of regional economic resilience to resource-based communities in varied geographical, regional, economic, and social contexts can be useful for generalizing factors that influence resilience in RBCs.

6.6 Conclusion

This research developed an analytic framework of regional economic resilience to explore the resilience of Devon. This study used federal census data, data available in municipal and regional government archives, data collected through informal discussion with municipal authorities, and municipal and regional policies. The results were discussed to explore how the Town of Devon has performed during the economic cycles and how policies are addressing issues to ensure long-term resilience. The data analysis show that Devon has experienced a high population growth rate, a rise in average personal and household income, a high home ownership rate, a low level of post-secondary educational attainment, and moderate high school completion rate. A significant share of employment was generated from mining, quarrying, and oil industries. These results showed the characteristics of a booming resource-based economy. Results from the policy

content analysis showed that policies recognized that Devon's economic sectors need diversification for long-term sustenance of the town. However, the policies do not specifically sketch out a plan for economic diversification. None of the policies explicitly states the possibility of an economic downturn in planning horizon, rather predicts continued economic growth. Results from policy content analysis also showed that the municipality put emphasis on environmental protection, municipal facility, and services, recreational and tourism and regional cooperation for the environmental protection and municipal cost sharing. Both data analysis and policy content analysis it is evident that Devon needs diversifications of economic sectors and there is limited evidence of effective policies to ensure that. Devon had weak resilience in environmental resilience, but new policies aim for better environmental conservation initiatives. The results of analysis based on the analytic framework of resilience showed that Devon had the potential to be non-resilient to an economic downturn typical of RBCs. Municipal and regional policies have made an attempt towards a resilient community while taking advantage of the geographical and regional setting.

In the Canadian economy, RBCs play a major role. Resource extraction activities are necessary to keep moving the wheels of economy and development. It is also important to make the resource-based communities resilient and sustainable. Careful consideration for the regional economic resilience of RBCs in Alberta is important to ensure long-term social, economic, and environmental sustainability of the communities in the province. The results of this research are relevant to the field of geography and municipal planning concerned with the resilience of RBCs in the face of economic boom and bust cycle and making effective policy decisions to sustain it.

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