# Applying Territorial Innovation Models to Less Favoured Regions in Western Newfoundland

by Ken Carter

©

Doctoral dissertation submitted

to the School of Graduate Studies in partial fulfillment of the

requirements for the degree of

Doctor of Philosophy

Department of Geography

Memorial University of Newfoundland

September 19th, 2022

St. John's Newfoundland and Labrador

**Abstract**

Less favoured regions are struggling to adapt to global competition within the knowledge-based economy. Territorial Innovation Models (TIMs), particularly regional innovation systems and entrepreneurial ecosystems, suggest that entrepreneurial startups compete on their ability to innovate. However, less favoured regions and resource-based economies struggle with applying lessons from these models that are tech focused, urban centric and oriented to high growth firms. The question arises as to what TIMs have to say in support of innovation and entrepreneurship in less favoured regions? The quadruple helix and regional innovation systems (RIS) suggest interactions between university research, government support, community partners and industry to increase collaboration to maximize local development. In less favoured regions, key partners are either absent or in a weakened state. Entrepreneurial ecosystems call for entrepreneurs to lead local entrepreneurial efforts to allow new startups to emerge and create wealth and employment. This is problematic where the culture of entrepreneurship is weak, and entrepreneurs are not leading ecosystem development. The first goal of this thesis is to outline issues that arise in applying TIMs to less favoured regions. The second is to develop a theory-based model that is more relevant to less favoured regions to support local entrepreneurs, governments, and industry to create positive economic change in their regions. This thesis brings together key factors of RIS, entrepreneurial ecosystems and less favoured regions to develop a model that is more relevant to these regions. This adapted model pulls factors across seven themes that have emerged from the literature review of RIS, ecosystems and less favoured regions, to produce a working model that can support these regions.

**Keywords:** Territorial innovation models; Regional innovation systems; Quadruple helix; Entrepreneurial ecosystems; Less favoured regions; Rural; Resource-based economies.

**Acknowledgements**

I would like to acknowledge the support Dr. Charles Mather as my PhD supervisor through the long process of completing this dissertation. I would also like to thank co-authors on Chapters in the thesis: Dr. Rob Greenwood (MUN) and Dr. Heather Hall (University of Waterloo) co-authored the peer-reviewed Chapter 2, *Newfoundland & Labrador - Missed Opportunities but Glimmers of Hope*; Dr. Kelly Vodden of Grenfell Campus, MUN, co-authored the peer-reviewed Chapter 3, *Applicability of Territorial Innovation Models to Declining Resource-Based Regions - Lessons from the Northern Peninsula of Newfoundland*; and Chapter 4, *The Anatomy, Possibilities and Challenges of a Peripheral Entrepreneurial Ecosystem*, drew from an earlier Harris Centre funded initiative, *Mapping Knowledge Seeking in the St. John's and Corner Brook Entrepreneurial Ecosystems*, co-written with Dr. Blair Winsor. Dr. Winsor mapped and analyzed the St. John's ecosystem while I separately and independently mapped and analyzed Corner Brook's ecosystem. Chapter 4 is based solely on the findings of the Corner Brook data. I would also like to acknowledge Dr. Billy Newell, Business Program, Grenfell Campus, MUN, Dr. Brennan Lowery, Grenfell Campus, MUN, and Dr. Mery Perez, Grenfell Campus, MUN, who read and provided valuable feedback on Chapters in the dissertation. I also acknowledge the many colleagues and community partners I have worked with in Corner Brook and the Northern Peninsula who inspired me with their passion and commitment to their communities. Finally, I would like to dedicate this dissertation to my family. First, my partner Medina Stacey, who supported me throughout this process and made many sacrifices so I could finish, and second, our children and grandchildren who have sustained us through the journey.

**Table of Contents**

## List of Tables



## List of Figures

**Co-authorship Statement**

The following manuscript-style dissertation includes collaboration on several Chapters with several colleagues. For all content within this dissertation, I am the primary author. My supervisor Dr. Charles Mather has provided guidance throughout the process including discussions on conceptualizing Chapters, collecting data and analyzing results. Research ethics clearance for two data-based Chapters were granted in partnership with Dr. Kelly Vodden, (Chapter 3) and Dr. Blair Winsor, (Chapter 4). For Chapters 1, 4, 5 and 6, I am the sole author but benefitted from feedback from colleagues as outlined in the acknowledgement section.

The co-authored Chapters had the following contributions:

Chapter 2: I undertook a literature review for the Chapter and did preliminary analysis, writing and revisions, and preparation for submission to the University of Toronto Press. My co-authors, Heather Hall and Rob Greenwood, gave extensive support on conceptualization, editing, and preparation for submission. The article is currently in press as Chapter 5 in *Ideas, Institutions, and Interests: The Drivers of Canadian Provincial Science, Technology, and Innovation Policy*, Peter WB Phillips and David Castle, editors. Toronto: University of Toronto Press. 978-1-4875-0676-6.

Chapter 3: I conducted all data collection and analysis, writing, and revisions. Kelly Vodden contributed extensively to conceptualization, informing research design and methods (e.g., methodological approach, interview selection), supporting editing, providing insights from firsthand knowledge of the region and interviewees, and finding an appropriate journal (special edition of the *Journal of Rural and Community Development*).

## Chapter 1: Introduction and Overview

Corner Brook Pulp and Paper (CBPPL) is a longstanding anchor firm of the west coast of the island of Newfoundland. CBPPL is the last of the three large forestry operations in the province after mills in Stephenville and Grand Falls-Windsor closed in 2000 and 2010 respectively. The company employs 500 people between the mill and the woods operations, making it the largest private sector employer in the region. The main competitive advantage for the mill is the ownership of Deer Lake Power where 120 MW of electricity are generated at very low cost, ensuring the mill remains one of the lowest cost producers in North America. CBPPL has been working with Grenfell Campus, Memorial University, College of the North Atlantic, the City of Corner Brook and the federal and provincial governments in support of an innovation agenda for the local bioeconomy. This includes engaging process engineering through Memorial on challenges with production efficiency, Grenfell agricultural scientists to review possible uses and products from ash and sludge waste, and Grenfell business faculty on market research questions related to proposed new products. The mill is collaborating with the same partners on a Centre for Innovation and Research to be housed in the former human resources building in downtown Corner Brook. CBPPL is contributing significantly to the operational costs of the new Centre and committed to a research and training agenda to support innovation at the mill. At the time of writing CPPL employed Grenfell Campus post-doctoral fellows as well as masters and PhD students on a range of research initiatives. In addition, partners are organizing a research forum and startup weekend to develop new business opportunities utilizing the partnerships and the new space.

Ben Wiper is an entrepreneur living in Roddickton on the Great Northern Peninsula. His startup, 3F, is collecting fish waste, which accounts from 30-70% of the biomass taken through

the North Atlantic fishery, across finfish and shellfish species. 3F has been working with engineering, biochemistry, and functional foods at Memorial University to maximize the value of landings by processing waste streams that would otherwise be dumped at sea or in a landfill. 3F began life as a startup with support from Memorial's Navigate Entrepreneurship Centre in Corner Brook and the Genesis Centre in St. John's. The startup has been hiring Boreal Ecosystem and Agriculture Science graduates from Grenfell Campus to turn these waste streams into high value products including collagen for the makeup industry, clothing products and agricultural supplements. While this is an early-stage startup, Ben has been successful at pitching events and has attracted funding to move the business forward from an innovative idea to commercialization of novel products from fishery waste streams.

## 1. Context for Dissertation

I raise these two short descriptions of the CBPPL and 3F to underline that innovation and startups are possible in resource-based industries in less favoured regions where key partners collaborate. These examples are grounded in the regional historic path development of the bioeconomy and the fishery, but they are building on these platform strengths of the region to branch into new areas of development that are based on application of university research and entrepreneurship that can support new product development and become novel economic development that supports employment in the region.

This dissertation reflects the author's longstanding connection to the Great Northern Peninsula and the West Coast of the Island of Newfoundland. My career as an economic developer and policy director with the provincial government and the director of research and engagement at Grenfell Campus, Memorial University, provided significant opportunities to

have a front seat to regional development efforts in these regions and to work closely with the regional partners across governments, entrepreneurs, communities, and postsecondary institutions on many development projects over a period of 20 years.

This thesis is about new regionalism and particularly the relevance of new regionalist thinking in the context of less favoured regions. These two concepts – new regionalism and less favoured regions - require some exploration upfront. New regionalism suggests the region is the appropriate level for policy and practice to support economic development, innovation and entrepreneurship. It suggests broader and more inclusive governance and interactions across governments, industry, community, and universities will lead to better development outcomes. New regionalism explores shifts taking place in regions as they move from comparative advantage based on natural resources to competitive advantage based on learning and innovation (more on this in Chapters 3 and 5). In this post-productive world, rural and peripheral regions are shifting from primary industries to more diversified economies, from a focus on economic sectors to territory/place (Chapters 3 and 5), and from a managed economy to an entrepreneurial economy (Chapter 2). This shift has also been accompanied by a clearer focus on innovation, competition and entrepreneurship (see Chapters 2, 3, and 5).

Two regional case studies are used to explore new regionalist trends, in two less favoured regions, the Great Northern Peninsula and Corner Brook. The case studies broaden the regional development context to include social enterprise and key shared assets as critical components of territory/place. The literature on entrepreneurship and regions has flagged social enterprise and regional assets as key components to regional development (Chapter 5). Territorial innovation models have emerged from new regionalism, but have been tech, urban and high-growth focused (Chapters 4 and 5). A key criticism of new regionalism has been the charge of neoliberal

abandonment of rural and peripheral places (Chapters 2, 5 and 6). The thesis explores from a policy perspective the support requirements in less favoured regions.

The GNP is a remote rural region with a small and sparse population and limited capacity for local leadership, entrepreneurship, and post-secondary education/ research (Chapters 3 and 5). Corner Brook, on the other hand, is a peripheral small city with university and college campuses, some entrepreneurial capacity and local leadership capacity. Within this dissertation I refer collectively to these regions as less favoured regions. This is not to say they have a lot in common, but they share a number of challenges including peripherality, slower economic development, and demographic challenges. Both regions have suffered from within the broader context of uneven development in the province where the Avalon Peninsula has seen robust growth relative to other regions. Using the term less favoured regions captures the common challenges but is not meant to gloss over the significant differences between the GNP and Corner Brook.

The goal of this thesis has been to interpret theory innovation and entrepreneurship theory relevant to the case studies to support applicability to the regions. The literature reviews undertaken have informed my work and helped me to better understand the dynamics of these less favoured regions. I am currently involved in projects that are explicitly implementing the regional innovation system (RIS) and ecosystem models in these regions. The experience working in regional economic development has led to a eagerness to contribute to academic knowledge while also benefitting practitioners like local entrepreneurs, industry, and communities.

In the search for new ways of understanding impediments to economic growth in less favoured regions, this dissertation looks to territorial innovation models (TIMs) for inspiration.

There are critical themes and factors that these models conclude are foundational to innovation and entrepreneurship growth and that can support policy and practice. The RIS and entrepreneurial ecosystem models are increasingly seen as linked and the goal of this study is to bring them together to show how this combination can benefit less favoured regions. However, the review of these models with a lagging region lens shows they are urban and tech centric and therefore limited in their applicability to the regions studied, so attempts to apply them in such regions need to also be aware of these limitations and consider how these regions differ from urban centres.

## 2. Contribution to Knowledge Statement

TIMs, including economic clusters, regional innovation systems, creative class theory and most recently entrepreneurial ecosystems have explained uneven development through the benefits of agglomeration accruing to cities, where a critical mass of firms/startups, highly skilled people, knowledge spillovers, universities, resources, and capital come together in ways that ensure increasing returns to firms and entrepreneurs. Most of these theories either outright state or imply that those places that do not attract agglomerations of these various capacities will fall behind and are unlikely to succeed over time. This dissertation reviews two such models, RIS and entrepreneurial ecosystems, with respect to what lessons they can provide for less favoured regions. Regional innovation systems, and particularly entrepreneurial ecosystems, have developed theory particularly relevant to cities, technology and high growth firms. Case studies in the literature are most often undertaken in larger urban centres and there is scepticism that smaller places will be able to achieve the benefits that the models promise.

The contribution of this thesis is to draw from learning in other regions related to these models and adapt them to less favoured regions through two case studies in Newfoundland and Labrador. The application of the RIS and ecosystem models to less favoured regions can give guidance on how to evolve the regions and support economic development. In Chapter 2, I review innovation and entrepreneurship policy and practice in Newfoundland and Labrador to understand the context of the case studies more fully. This has added to the understanding of policy development over the past 20-30 years and made recommendations including ensuring that the province addresses uneven development where resources are made more available for urban tech startups  The case studies of the Northern Peninsula and West Coast of the island in Chapter 3 and 4 specifically engage the RIS and entrepreneurial ecosystems against a backdrop of less favoured regions. These Chapters contribute to the case studies on rural, where less attention has been paid. Chapter 5 contributes to knowledge by developing a fit for purpose innovation and entrepreneurship model by taking key lessons from RIS and entrepreneurial ecosystems and applying these in the context of less favoured regions. Overall, this new model is the main contribution of the thesis, and while developed in the context of the island of Newfoundland can potentially support other less favoured regions left behind in the tech and high growth era.

## 3. Problem Statement

Less favoured, rural and lagging regions are struggling to adapt to an increasingly competitive global and knowledge-based economy. In their search for new approaches to revitalization, these regions need better tools for regional development in terms of public policy and practice. This need cuts across system-level innovation as expounded through the RIS model as well as recognizing individual agency through entrepreneurship that is at the heart of regional

development. Increasingly the RIS and ecosystems models are being linked together to bring systems level thinking together with the ecosystem focus on the centrality of entrepreneurial agency. The combination of these two key elements of regional development represents a more robust approach to regional development in less favoured regions.

Resource sectors, while still a critical component of rural/peripheral economies, are characterized as 'dirty dangerous and dying', suggesting that they are not appropriate spaces for innovation and startups. While significant resources are put to opportunities for innovation and startups/ entrepreneurship in tech related industries, innovation and supporting startups related to key resource-based and other assets in rural areas are largely ignored. Discussions of less favoured regions often define them by their weaknesses and liabilities. But it is also important to discuss strengths and assets and what is going right in these regions. These local strengths and assets can lead to new paths of development.

A key theme in economic geography has been uneven development across jurisdictions and regions. Why do some regions thrive while others lag? This is a particularly relevant question in Newfoundland and Labrador where much of the province lags the Avalon Peninsula of the province in terms of development and generally has benefitted less from the knowledge economy and the growth associated with technology development. New regionalist literature suggests that regions are the appropriate level for economic development, planning, and governance. Emerging from this literature, TIMs have focused on better understanding the dynamics of regions and economic growth. The literature has evolved over time and the current debates have linked RIS and entrepreneurial ecosystems. However, little has been done to review and adapt this literature to less favoured regions.

## 4. Statement of Coherence and Overview of the Chapters

This thesis has engaged with key themes in the new regionalist literature to better understand how TIMS are applicable to les favoured regions in this province. Chapter 1 shows that Newfoundland and Labrador, while having some success, has overall lagged on the development of innovation and entrepreneurship in resource-based sectors including oil, mining, forestry, and the fishery despite significant funding available particularly through benefit agreements in the oil sector and significant spending on research infrastructure at Memorial and CNA. Fishery and forestry are largely stagnant or declining with opportunities to produce higher value products or new startups around waste streams lacking (notwithstanding the examples that began this introduction). The Chapter also shows that significant resources are allotted to tech industry startups, particularly in St. John's, and that where resources have been made available there has been success (e.g., Verafin and other startups supported through Memorial University's Genesis Centre). However, efforts to support startups across the rest of the economy and particularly in rural areas of the province have lagged, leading to a need for a more geographically and sectorally equitable approach to economic development and innovation

For these reasons the applicability of TIMs such as RIS and ecosystems to less favoured resource-based regions are limited by factors found in these regions and through the development of public policy. The lack of attention to rural areas within TIMs, particularly with the newer entrepreneurial ecosystem model, is a gap in the literature that this thesis attempts to address. The overarching research questions of the thesis are: what are the issues related to applying TIMs to less favoured regions; and can a TIM be adapted/developed that considers the nature of these regions?

The manuscript-style dissertation gives an overview of application of TIMs to less favoured regions through four related papers that are brought together here as Chapters. The objectives include: 1) better understanding the innovation and entrepreneurial context of the province; 2) reviewing the RIS model and its applicability to less favoured regions; 3) applying the ecosystem model to a less favoured region; and 4) adapting RIS and ecosystems models to better explain innovation and entrepreneurship in a lagging regions context. Overall, the dissertation investigates issues impeding development of less favoured regions of the province in the face of increasing globalization, competition, and reliance on innovation within the knowledge-based economy.

Chapter 2 is foundational for the entire dissertation. The Chapter sets the context for reviewing innovation and entrepreneurship within the province of Newfoundland and Labrador as well as the broader context for regional economic development. The Chapter gives an overview of public policy developments in these fields since 1980. Notable findings of the literature and grey literature review are that the resource-based sectors have seen limited innovation and intellectual property development and are not focused on supporting startups to the extent evident in the tech industry. This has significant impact on less favoured regions of the province where resource-based sectors dominate. The Chapter also finds that while the province is known for its strong culture, this is not translating to entrepreneurship strength and commercialization with the notable exception of tech success in St. John's. The Chapter notes that supports for startups, particularly tech startups connected to Memorial University in St. John's, have paid large dividends through employment growth and investment attraction. Another finding is that the province's predisposition for charismatic leaders has tended to mean

discontinuity, inconsistency, and limited engagement by the provincial government with the innovation and entrepreneurial ecosystems.

Chapter 3 is a case study of the Great Northern Peninsula (GNP), investigating the applicability of RIS to the GNP through a series of interviews with local innovation partners including business, government, postsecondary institutions, and community. The Chapter finds key factors, including a weak and dispersed private sector and a lack of resources at the municipal level, limit the effectiveness of territorial innovation model recommendations for spurring innovation through greater interaction among governments, post-secondary institutions, firms, and community organizations. When key partners are missing from planning tables, these plans are less likely to succeed. The Chapter found that other elements of territorial innovation models related to learning, network facilitation, increased knowledge flows, connections with post-secondary institutions, and development of a shared vision and action plan could, however, benefit the region if more focus was put on these key factors.

Chapter 4 maps the entrepreneurial ecosystem of Corner Brook, showing connections between and among key actors in the ecosystem including primarily entrepreneurial firms, governments, support agencies and post-secondary institutions. The Chapter found that Corner Brook was in the early or nascent stage of ecosystem development with limited development of key factors for ecosystem success, but with the key ingredients required for ecosystem growth, including new startups, university connections, regular entrepreneurial activities and other factors. Models such as Cukier et al. (2015) outline factors that need to be further developed and could support ecosystem growth, but the model is tech focused and urban centric, limiting its applicability to the region and so the model requires adaptation to this very different context and circumstances.

Chapter 5 aims to make a conceptual contribution, reviewing the literature on less favoured regions, RIS and entrepreneurial ecosystems to illustrate key themes and factors that impact innovation and entrepreneurship development. The resulting themes and factors provide the foundation for a tailor-made TIM adapted from ecosystem and RIS models for less favoured regions. This TIM follows ecosystem models by prescribing stages of development, thereby outlining steps for policy and practice to grow the ecosystem in these regions. The Chapter then engages the case studies of Chapters 2 and 3 to review the applicability of the model to Corner Brook and the GNP regions. The model better reflects the challenges of these less favoured regions and supports the development of a model specifically designed for these places.

The adapted territorial, innovation and entrepreneurship model presented in this dissertation retains the system level factors such as the focus on interactions of key actors and planning taken primarily from the RIS approach, while acknowledging the central role of entrepreneurship and startups in regional development. In this way, the model responds to both RIS and entrepreneurial ecosystems models: innovation and entrepreneurship. It adds an enhanced understanding of the needs of lagging regions and thereby incorporates into the model key factors specific regions: building from regional strengths, broadening the view of entrepreneurship to include community and subsistence efforts, and recognizing the roles of supports actors in fledgling ecosystems.

In reviewing the literature from RIS, entrepreneurial ecosystems and less favoured regions, the model presents factors across seven themes: financing/markets, governance, connecting partners, metrics, activities/ spaces, communications, and values. There are 17 factors in total across the themes. The goal of the model is to provide a roadmap for lagging regions to support innovation and entrepreneurship. This roadmap is not currently available, and I hope it

can guide local efforts to build sustainable communities in lagging regions through tailoring a model to their specific needs.

Finally, Chapter 6 outlines findings and contributions of the thesis to ongoing debates about less favoured regions and TIMs. I also discuss limitations of the thesis and opportunities for further research in applying TIMs and particularly the model presented to less favoured regions. Policy related recommendations are outlined to suggest ways governments, universities and other organizations can support innovation and entrepreneurship in less favoured regions.

## Chapter 2: Newfoundland & Labrador - Missed Opportunities but Glimmers of Hope[1]

**Abstract:** Over the past two decades, there have been many missed opportunities and some glimmers of hope with regards to science, technology, and innovation (STI) policy in Newfoundland and Labrador (NL). Four themes stand out. First, there are STI opportunities in the province's resource sectors, especially the large resource-based benefits agreements that support research and development (R&D) and innovation in those sectors. These offer a number of success stories, particularly in local supply chain development (Stantec Consulting 2019). Benefit agreements, however, have underachieved on creating new R&D, expanding value-added processing capacity and developing export potential that creates sustainable employment and business spin-offs (Hall and Vodden 2019). Second, current STI policy has focused on supporting highly motivated start-ups through a collaborative regional approach that aligns with innovation and entrepreneurship ecosystems, and this policy is bearing fruit. Third, the province is recognized for its vibrant culture and strong sense of place, providing rich, untraded interdependencies (Greenwood, Pike, and Kearley 2011; Vodden, Carter, and White 2013). These strengths, however, have not led to substantial innovation outcomes or to commercialization in the provincial context (Walsh and Winsor 2019). Finally, and perhaps most important, provincial politics has created discontinuity and inconsistency in the development of STI policy relative to other jurisdictions. The provincial political landscape has been dominated by strong personalities who have inhibited broader engagement within the innovation ecosystem – particularly industry partners as well as broader coalitions of community, Indigenous, and

1 This manuscript is published as a book Chapter in Phillips, W.B. and Castle, D. (2021). *Ideas, Institutions, and Interests: The Drivers of Canadian Provincial Science, Technology, and Innovation Policy*. University of Toronto Press. 978-1-4875-0676-6.

other partners. This Chapter provides a brief socio-economic overview of Newfoundland and Labrador, outlines the key actors in the innovation ecosystem, offers an overview of provincial STI policy since the 1980s, discusses the implications, and offers some key conclusions.

**Keywords:** Science, technology and innovation policy; resource-based development; innovation ecosystem

## 1. Context

Newfoundland and Labrador has a complex socio-economic situation. There are some signs of growth and prosperity, coupled with troubling fiscal and investment trends. The province last received equalization payments from the federal government in fiscal year 2007/08 (Bernard 2012). Historically the federal government has had lower levels of spending in NL than in the other Atlantic provinces (Harris Centre 2006) while NL has contributed more to federal revenue per capita than any other Atlantic province. NL is confronted by high provincial taxation, spending, and deficits compared with other provinces, leading Schroeder and Hallett (2019) to argue that, without federal intervention, the province could be facing bankruptcy.

In 2017, the goods-producing sector accounted for 43 per cent of the province's gross domestic product (GDP) (Newfoundland and Labrador 2019a). Oil and gas extraction (14 per cent of GDP) and mining (6 per cent) are the major drivers, with oil and gas extraction dominating the economy and provincial government revenues for close to two decades. After a lengthy period of decline, the fisheries have stabilized, with reductions in the wild fishery mitigated by a growing aquaculture sector. Forestry has also declined significantly over the past twenty years, with two paper mill closures. The loss of jobs in the fishery and forestry has been only partially compensated by gains in oil and gas, mining, and their related supply sectors,

which together represent only 3.5 per cent of total provincial employment (Newfoundland and Labrador 2019a). As a result, unemployment has remained high, in part attributed to a lack of value-added development in these extractive industries.

Non-extractive industries contribute significantly to the provincial economy. One particularly bright spot is growth in the St. John's–based tech sector. The Newfoundland Association of Technical Industries (NATI) estimates that the sector has revenues of $1.6 billion, making it larger than the fisheries, forestry, or tourism. Employment in the sector is estimated at 4,000 (NATI 2020), which makes the sector an important employment generator in the province. This urban-based sector helps St. John's rank seventeenth overall in the country on technology talent, tenth in technology concentration, and thirteenth in educational attainment (CBRE 2019).

One huge success story is Verafin, the world's largest financial crime management company, which secured $515 million in equity and debt recapitalization, representing "one of the largest ever growth financings of a Canadian software business", and which was acquired in 2020 by NASDAQ for $2.75 billion (CBC 2020). The founders, Jamie King, Raymond Pretty, and Brendan Brothers, were doing graduate work in the Faculty of Engineering at Memorial University of Newfoundland, where they had developed robotic software for the mining industry. They decided to apply their technology to fight financial crime. Verafin spent its first few years at Genesis, an incubator at Memorial University, and the NASDAQ buyout will see $1 million invested in start-ups at Genesis (CBC 2020). Local firm Killick Capital was one of the company's earliest investors. With 600 employees and significant growth, one challenge for Verafin is attracting talent, and it is currently working with the College of the North Atlantic (CNA) and Memorial University to train the programmers needed to support this growth.

Other non-extractive industries include tourism, which generated $567 million in non-resident spending in 2018. It also provides a much-needed economic diversification opportunity and generates significant employment, particularly in rural areas of the province.

NL has a higher proportion of smaller firms to larger firms (over 500 employees) relative to other provinces, but those larger firms contributed disproportionately to employment between 2013 and 2017 (see Chapter 4). This is partly a result of construction at the Voisey's Bay nickel mine and Long Harbour processing facility, the Muskrat Falls hydro development, and oil platform construction during that period. The predominance of smaller firms perhaps is a factor in the weak capacity of business to organize and support STI policy input.

In 2016, NL had a population of 519,880, but population modelling suggests it could decline to roughly 495,000 people by 2036 (Simms and Ward 2017). The Harris Centre has shown that the province is home to Canada's most rapidly aging population, with high out-migration of young people, significant rural migration to urban centres, and declining birth rates (Simms and Ward 2016). These trends converge to create a population challenge that will dramatically affect the economy, governance, and quality of life for residents as most regions, with the exception of Northeast Avalon in the St. John's region and some parts of Labrador, will see significant population decline (Simms and Ward 2017).

The largest city in the province, St. John's, had a census metropolitan area population of 205,955 according to the 2016 census. As the provincial capital, it has stronger policy and fiscal capacity than cities of similar size in other provinces, but it is geographically remote and peripheral in the Canadian context (Lepawsky, Phan, and Greenwood 2010). The St. John's city-region has had significant growth as a headquarters and supply base for offshore oil and gas development, a growing tech sector, tourism, and a mix of non-resource–based industries. As a

result, the city has a relatively healthy labour market, pulling rural residents to the area. The city has greater capacity for government, university, industry, and community collaboration, as well as co-construction of innovation and regional development goals, although there is no guarantee this will happen. One challenge is the "come from away" – a local expression for someone who moves to the province – or insider/outsider dynamic, which can act as a barrier to the integration of newcomers to the province (Lepawsky, Phan, and Greenwood 2010).

NL also has a high percentage of rural residents per capita. In 2011, 42 per cent of residents lived in rural regions – areas with fewer than 1,000 inhabitants and a population density below 400 people per square kilometre (Statistics Canada 2020). These smaller communities generally have weak municipal capacity and lack regional governance structures that could provide a base for regional innovation partnerships. Long distances within regions and to service centres, low and declining population density, and the challenge of responding to climate change are challenges for rural regions (Reimer and Bollman 2010). Carter and Vodden (2017) find that on the Great Northern Peninsula, one of the most remote regions of the province, there is limited capacity in the private sector or municipal governments, creating a void in the partnerships needed to spur innovation.

The periodic pull of high-wage employment in other provinces, most notably Alberta, has led to a higher rate of long-distance commuting in sectors such as mining, quarrying, oil and gas extraction, utilities, and construction (Hewitt, Haan, and Neis 2018). From an innovation perspective, this mobile workforce, or "been aways" (Greenwood and Hall 2016), has the potential to bring back valuable entrepreneurial experience and skills to the province. It has also created a new kind of single-industry town in rural NL, one that is dependent on a geographically

distant employer (see Storey and Hall 2018), where residents build houses and have families locally but work elsewhere (most often in Alberta).

Finally, NL is known across Canada and internationally for its rich culture. The cultural renaissance began in the 1960s with arts collectives such as the Mummers Troupe and Codco, which tackled mainland misconceptions and celebrated a positive sense of identity among Newfoundlanders and Labradorians (Higgins 2012). Alongside this cultural revival was a stirring of resource nationalism connected to the Churchill Falls deal with Hydro-Québec in the late 1960s (Collins and Reid 2015). This "place making" generated a nascent pride and emergent nationalism in the province (Hiller 2007) and led to calls for the province to attain a more favourable relationship with Ottawa and other provinces, partly to right perceived wrongs, particularly the Churchill Falls contract and ownership of offshore resources. It also created a strong sense of place and connection to "home" (Greenwood and Hall 2016) that could be used to support and facilitate innovation.

## 2. The Innovation Architecture

An innovation ecosystem describes the complex relationships among actors across the quadruple helix of government, post-secondary education, industry, and community. Adner and Kapoor (2010) use the innovation ecosystem terminology to make interdependencies more explicit. Relationships among players in the ecosystem are critical to enhancing the development of technology and innovation (Hall et al. 2014). The innovation ecosystem in NL is dominated by the provincial and federal governments, Memorial University, and CNA. These larger organizations have significant institutional capacity to fund and do science, to promote the use of technology, and to innovate. The provincial government relies heavily on federal fiscal support

for innovation policy and practice, and while both industry and civil society actors generally have fewer resources and more limited capacity to contribute to the ecosystem, they are increasingly active.

The current provincial government lead on innovation policy is the Department of Tourism, Culture, Industry and Innovation (TCII). Innovate NL – formerly the Research and Development Corporation (RDC) – was relaunched within TCII in 2016 and has maintained funding levels similar to the RDC in support of entrepreneurship and regional economic development. The RDC was originally a creation of the Danny Williams Progressive Conservative (PC) government during a period of significant oil and gas revenues. It was intended to direct provincial government R&D investments into strategic sectors, but became a lightning rod for top-down provincial dominance of the ecosystem. After the demise of the RDC as a stand-alone government entity, the innovation agenda became more widely dispersed across other departments within the provincial government, with Fisheries and Land Resources, Natural Resources, and others active in the innovation ecosystems underpinning the fisheries and aquaculture, agriculture and agri-food, and oil and gas sectors. The provincial government has become increasingly important to the innovation ecosystem with its greater capacity to fund initiatives and infrastructure, although that capacity has waxed and waned with oil revenues and is currently in a weakened state. Policy prior to 2000 tended to focus on employment generation as the province struggled with high unemployment. Since then, the focus has been more clearly on innovation and firm development. The key innovation policy initiative of the current Liberal provincial government is The Way Forward process (more on this below).

**Table 1: Gross Expenditure on Research and Development by Performing Sector, Newfoundland and Labrador, 2013–17**

| Funders | Performers | | | | | | |
|---|---|---|---|---|---|---|---|
| | Total | Government | | Provincial Research Organizations | Business Enterprise | Higher Education | Private Non-profit |
| | | Federal | Provincial | | | | |
| | (average $ millions) | | | | | | |
| Total sectors | 314 | 17 | - | - | 87 | 209 | - |
| Federal government | 55 | 17 | - | - | 8 | 30 | - |
| Provincial government | 13 | - | - | - | 2 | 11 | - |
| Business enterprise | 112 | - | - | - | 70 | 42 | - |
| Higher education | 123 | - | - | - | - | 123 | - |
| Private non-profit | 4 | - | - | - | 1 | 4 | - |
| Foreign | 8 | - | - | - | 8 | - | - |

Source: Statistics Canada, table 27-10-0273-01, "Gross domestic expenditures on research and development, by science type and by funder and performer sector (x 1,000,000)." (Note: Columns and rows may not sum due to rounding).

The federal government is a critical player in NL, especially through its lead agency, the Atlantic Canada Opportunities Agency (ACOA). Since its inception in 1987, ACOA has made major investments in business support, the innovation ecosystem, and infrastructure. ACOA was designed to be more flexible than previous federal regional development entities – an arm's-length agency with a focus on innovation, education, entrepreneurship, training, and local development (Dewolf, McNiven, and McPhail 1988). Other federal organizations in the innovation ecosystem include the Tri-Agency agencies, which fund university-based research, including some important industry-partnered projects, and the Canadian Foundation for Innovation, which has provided funding for infrastructure related to ocean research, often partnered with offshore industries that offer access to their research infrastructure. The National Research Council's Ocean, Coastal, and River Engineering Centre in St. John's studies ice and wave effects on marine transportation and coastlines, while the Department of Fisheries and Oceans and Natural Resources Canada both contribute to research in the province.

The 2015 Atlantic Growth Strategy, launched by four provincial premiers and the prime minister, has worked to broaden collaboration and linkages across the region. Some key initiatives in the strategy include supporting the Ocean Supercluster, accelerated growth service, a network of incubators and accelerators, sectoral funding for industry research and innovation, the Atlantic Fisheries Fund to support innovation, infrastructure, and science partnerships, and skills development in the fish-harvesting and -processing sectors.

Memorial University, the province's only university, is an active collaborator in the innovation ecosystem, particularly around ocean science, fisheries, forestry, mining, and oil and gas research. With 80 per cent of its operational funding coming from the provincial government, the university acknowledges a special obligation to the people of the province. Memorial is a uniquely locally embedded university, with a multicampus structure that promotes public engagement within the province and beyond. Over the past ten years, Memorial has focused on increasing research intensity and has doubled graduate enrolment to over 4,000 students, including 900 PhDs, 75 per cent coming from outside the province (Memorial University 2019). Engineering enrolment has doubled, and major science infrastructure has been built on the St. John's campus. The increased capacity at Memorial is a major addition to the innovation ecosystem.

Memorial's Marine Institute is a key contributor to fisheries and oceans research, with world-class infrastructure and research capacity focused on collaborating with industry. When the fishery in the province faced an existential crisis in the early 1990s, Marine Institute played a significant role in undertaking research and training to refocus the offshore fishery from groundfish to primarily crab and shrimp and in spurring aquaculture development, and supported the innovative shifts in fishing gear, technology, and training required to accommodate these

changes. Landed values increased dramatically, and employment stabilized at more than 21,000, albeit at the cost of more than 16,000 jobs in the offshore fisheries (Williams 2019). In this case, crisis was a huge motivator to innovation.

C-Core, a separately incorporated R&D organization on Memorial's St. John's campus, offers key expertise in ice engineering, geotechnical engineering, and remote sensing. Collectively, the province has significant infrastructure and research capacity related to oceans research, and is recognized federally through ACOA as a key leader in Atlantic Canada in oceans technology. According to Warrian and Wolfe (2016, 2017), the approaches of Marine Institute and C-CORE in supporting firms that are reaching and implementing technology readiness levels (Mankin 1995) are unique in Canada, effectively linking post-secondary research and development capability with industry commercialization.

R&D and training related to fisheries and ocean technology have seen collaboration among regional universities and industries in Atlantic Canada, leading to larger, ocean-based funding arrangements. The Ocean Frontier Institute, a partnership between Memorial, Dalhousie University, and the University of Prince Edward Island, supported by the Canada First Research Excellence Fund, has generated world-leading scale in ocean innovation capability. The momentum of the Ocean Frontier Institute and the demonstration that the Atlantic provinces can collaborate on innovation have helped advance other ventures. The successful private-sector–led application to the federal supercluster program, the Ocean Supercluster, brings together oil and gas, fishery, aquaculture, marine transportation, and other ocean technology firms in partnership with universities, Indigenous organizations, and governments.

Memorial is a key supporter of entrepreneurship and start-ups, through Genesis, a high-growth technology incubation, acceleration, and co-working group, owned by Memorial but with

a standalone governance structure; the Memorial Centre of Entrepreneurship, a pan-university student entrepreneurship facilitator led jointly by the business and engineering faculties; Navigate, a partnership between Corner Brook's Grenfell Campus of Memorial and CNA; and additional start-up programs in the health sector and for graduate students. The university also operates a Technology Transfer and Commercialization Office and collaborates with Springboard, an Atlantic Canada network to build stronger relationships between university research and industry commercialization. A recent example of entrepreneurship and innovation is the Lab2Market program, designed to support science-based graduate student start-ups. Memorial has also launched a new intellectual property framework for the university, established a multilevel innovation strategy, and launched the Emera Innovation Exchange in downtown St. John's, which houses public facing bodies including the Genesis business incubator, Memorial's Harris Centre for public policy and regional development and the Office of Public Engagement.

The College of the North Atlantic, the public college system, provides training and encourages applied research and technology adoption. Formed in 1997 out of an amalgamation of five community colleges, CNA has more direct policy linkages to the provincial government and its development is more connected to political aspirations than is Memorial. The college supports industry and community engagement, external partnerships, and applied research, particularly with local firms and sectors. Applied research and innovation at CNA is administered under the college's Office of Applied Research and Innovation, housed within the broader Office of Partnerships, Innovation and Entrepreneurship. This office runs the College Innovation Network, which works to provide equipment, infrastructure, students, graduates, and staff to support applied R&D and business development. It also supports the planning, execution, and management of applied industry projects that address challenges limiting firm-level

competitiveness and growth. The College Innovation Network both mentors firms and performs the role of innovation intermediary, helping to bridge the gap between small and medium-sized enterprises (SMEs) and to support resources both internal and external to the college. The network offers SMEs a continuum of support services, including assistance with sourcing funding, networking and collaboration, technology transfer, and innovation management. CNA operates a number of key applied research and innovation facilities, including the Wave Environment Research Centre, Manufacturing Technology Centre, Centre for Energy and Thermal Systems, Innovative Product Development Lab, Applied Mineralogy Lab, Mineral Processing Lab, and Hyperspectral Imaging for Geological Applications Lab. These and other knowledge infrastructure promote a skilled workforce and support applied research partnerships with industry. While CNA is not as active in research as is Memorial, it is more industry driven and is an active partner in the innovation ecosystem.

Industry associations in the oil and gas, mining, technology, manufacturing, fisheries, forestry, environmental, aerospace, and tourism sectors also play key roles in the innovation ecosystem. They are usually supported financially by their membership and by the provincial and federal governments to bring industry views to the policy table, facilitate industry collaboration, and disseminate best practices. One key industry player is Petroleum Research NL, which manages joint industry investments in R&D through resource benefits agreements. In addition to multinational firms, the ecosystem has a number of larger local firms, including DF Barnes, the Cahill Group, and PAL (which grew from Provincial Airlines), all the result of oil and gas industry R&D that generated supply chain opportunities within and beyond the resources sector and local market (Stantec Consulting 2019). Numerous technology start-ups, mostly led by Memorial alumni – usually engineering and often Genesis incubator graduates – have been

supported by available local business mentors and investors as well as by university, industry associations, and governments. Many of these start-ups and corporate leaders are no longer beholden to government, which represents a positive shift in the business and innovation culture.

Indigenous governments across the province – including the Qalipu First Nation and Miawpukek First Nation on the island and the Nunatsiavut government, the Innu Nation, and the NunatuKavut Community Council in Labrador (Memorial University 2020) – are playing more strategic roles as key innovation actors. As resource beneficiaries and critical governance actors in the province, Indigenous governments have distinct strengths and challenges in addressing innovation and economic development. For example, the Nunacor Development Corporation, the business development corporation for the NunatuKavut Community Council, owns and operates a number of Indigenous companies throughout Labrador. Other Indigenous governments have similar development arms.

Finally, municipalities are important community players, and those with resources are active participants in their regions. The local boards of trade and chambers of commerce are particularly active in St. John's and larger centres, but they have broad and diffuse agendas not focused solely on innovation. In St. John's, these organizations have had a long-term commitment to ocean sector development, oil and gas, and R&D, but this has been focused – consistent with the municipality's resources and authority – on promotion and marketing. St. John's also played a role in fostering the development of OceansAdvance, a quadruple-helix cluster organization of industry, governments, post-secondary institutions, and community organizations that has helped to make the St. John's region a leading ocean cluster (Shearmur 2010; Lepawsky, Phan, and Greenwood 2010). Various industry associations, however, vie for leadership: the emergence of the Ocean Supercluster, with its own staff and alliances, combined

with the usual ebb and flow of government policy, has affected the ability of OceansAdvance to maintain its cluster role.

There are other examples of small municipalities proactively supporting innovation in their regions: Holyrood, thirty minutes from St. John's, at the head of Conception Bay, is collaborating with Marine Institute to brand itself as an ocean industry community; Corner Brook Pulp and Paper, the province's last pulp and paper facility, is working closely with Grenfell Campus and CNA on an innovation, training, and entrepreneurship facility for the bioeconomy; Grand Falls-Windsor, in the centre of the island, has focused on health care and partnerships with the Memorial faculties of medicine and nursing, to foster rural health care innovation and harness the province's unique founder population for genetics research; and Labrador North Chamber of Commerce partners with its counterpart in Nunavut to host the bi-annual Northern Lights conference in Ottawa to promote Arctic and Indigenous development. For the most part, local activity is rare; most small communities in the province lack capacity to engage in the innovation ecosystem (Greenwood 2017; Greenwood and Hall 2016).

There are encouraging indications of impact from the collective efforts across the quadruple helix on innovation. Recent initiatives such as the provincial Innovation Week, held annually since 2014, have engaged industry and entrepreneurs in a more active role in championing innovation. In addition, the provincial government's sector strategy initiatives in The Way Forward explicitly include members of civil society as co-chairs of the collaborative industry-government working groups. Workplans have been developed across sectors, including agriculture, business innovation, technology, oil and gas, and mining (Newfoundland and Labrador 2020). There is increasing recognition of the importance of including industry and community partners in these processes.

Although it is still too early to assess, there are signs of a growing entrepreneurial spirit in the province, born during the boom years of oil and gas development but sustained by Genesis, the Memorial Centre for Entrepreneurship, and Navigate, as well as a myriad other entrepreneurial supports (such as Community Business Development Corporations, the Newfoundland and Labrador Organization of Women Entrepreneurs, and Futurpreneur). There has also been growing leadership by entrepreneurs themselves, a critical element to building start-up communities (Feld 2012). One area of identified opportunity is encouraging more peer-to-peer connections among entrepreneurs in the St. John's and Corner Brook regions (Winsor and Carter 2018).

Investments in Memorial University are also showing early success, with a new wave of younger entrepreneurs who are succeeding across technology- and oceans-related sectors. Studies on the impact of the offshore petroleum industry on firm development in NL show many successes: Provincial Aerospace has connected to the offshore sector and achieved significant company growth; Kraken Sonar Systems is developing seabed imaging technology; and SubC Imaging is producing optical imaging systems for offshore markets (Stantec Consulting 2019). More and deeper interaction that leads to lasting change in the innovation ecosystem, particularly among firms, is required, however, to turn early successes into permanent innovation effects.

## 3. The Policy Efforts

STI policy efforts in Newfoundland and Labrador have gone through several phases since the 1980s, shaped by different premiers. This period includes resource nationalism, the rise of an innovation technocracy, an effort to exploit resource benefits and investment, and now a focus on

smart specialization (Foray, Goddard, Xabier et al. 2012). I turn now to a discussion of each of these phases, with particular emphasis on the interests shaping STI policy.

From a political standpoint, the 1980s set the stage for resource development that has had a significant impact on the province's fiscal and innovation capacity. The 1980s were dominated politically by PC premier Brian Peckford's battles with the centralist model of federalism. As long as the federal Liberal party was in power, Peckford made little headway on oil development, fisheries jurisdiction, or addressing the Churchill Falls hydro agreement with Quebec. A breakthrough came only with the Progressive Conservative win in the 1984 federal election and the signing of the Atlantic Accord on 11 February 1985. The deal gave the province greater decision-making powers and created the Canada-Newfoundland Offshore Petroleum Board. Motivated by the growing perception that the province should be the prime beneficiary of its abundant natural resources, the Atlantic Accord gave the provincial government the right to tax offshore resources in the same way as those onshore and ensured local preference in hiring, which set the stage for the oil boom in the province almost two decades later. Peckford's efforts were championed by federal cabinet minister John Crosbie, a fellow Newfoundlander. As Collins and Reid (2015) note, Peckford hoped that "have not will be no more" in Newfoundland and Labrador.

In 1986, Peckford established the Royal Commission on Employment and Unemployment, chaired by Memorial University sociologist Doug House. The House Commission conducted an extensive review of the NL economy and called for a balanced approach of leveraging emerging information technologies for SME development, diversification, and rural development, while continuing to advance large-scale developments in oil and gas, mining, and modernization of the fishery. The provincial public service was sceptical

of the approaches offered by House, and the Peckford government largely ignored the report (House 1999). Despite his efforts on oil and gas, Peckford resigned in 1989 amid controversy around a failed greenhouse that lost $22 million in taxpayer funding – a top-down initiative led by a premier frustrated by little progress to achieve his vision of resource nationalism.

The 1990s, under Liberal leaders Clyde Wells and Brian Tobin, saw the first benefits from the Atlantic Accord and offshore oil development through the Hibernia platform construction. Wells's early tenure included a prominent role in the demise of the Meech Lake Accord, persistently high unemployment, and budget cuts (Dunn 2005; House 1999) that delivered the province's first balanced budget. Wells was impressed by the House Commission and had campaigned with its recommendations as his economic policy platform in the 1989 election. Once elected, he created the Economic Recovery Commission (ERC) as a small, action-oriented think tank outside the mainstream bureaucracy, with Doug House as commissioner, reporting directly to the premier. The ERC led the creation of Enterprise NL (ENL) as a Crown corporation combining sections of line departments and a pre-existing business finance Crown. The ENL board, led by the ERC with an independent chair, significantly decentralized decision making for SME business and regional development support through five regional offices and 17 satellite offices.

Meanwhile, the ERC advanced a number of ventures, including: a New Opportunity for Growth Sector Strategy in concert with industry, post-secondary, and community organizations; establishing or strengthening private sector–led industry associations to champion sectoral diversification; leading a major pilot project on a guaranteed annual income (which was not implemented); working to establish a network of telecentres to foster the new information economy; and facilitating the establishment of Regional Economic Development Boards in

twenty economic zones throughout the province. House played a key role in developing a Strategic Economic Plan for the province, which was then mirrored by a Strategic Social Plan (Close 2007).

These efforts were just getting traction when the federal government implemented a groundfish moratorium in 1992 due to the collapse of cod stocks on the Grand Banks that saw the layoff of over 30,000 people in the fisheries in NL. This triggered a flood of out-migration from rural areas that continued for thirty years (Williams 2019). Wells's approach to policy making allowed policy innovations to be advanced despite frequent objections from the more steadfast bureaucracy. The massive economic, demographic, and community restructuring induced by the moratorium reinforced the need for innovation, but the election of Brian Tobin as Liberal premier in 1996 saw the return of a top-down charismatic politician in NL. The ERC was shut down and ENL was absorbed into a line department under strict political control and traditional bureaucratic oversight (House 1999).

The greatest benefits of the Atlantic Accord came in the PC era, which lasted from 2003 to 2015. Offshore oil revenues grew from $127 million in fiscal year 2003/4 to almost $2.8 billion in 2011/12 (Masoudi 2017). This period saw the re-emergence of the resource nationalism of the Peckford years, under the theme of "no more giveaways" (Collins and Reid 2015). The Atlantic Accord and royalties triggered an era of investment in innovation infrastructure. Spending on knowledge infrastructure and operating increases in the budgets of Memorial and CNA were a hallmark of this period. While the focus was on energy development, with large, resource-based projects dominating the economy – Muskrat Falls hydroelectric development in Labrador was the biggest and most controversial – targeted investments in infrastructure and the innovation ecosystem led to many high-profile successes in knowledge-based sectors.

In 2006, the Williams administration released Innovation NL: A Blueprint for Prosperity, which highlighted a range of innovation-related challenges, including: a relatively low level of investment in R&D by the private sector; limited access to risk capital and financing for commercialization; limited linkages and collaboration among post-secondary institutions, industry, and communities; a lack of innovation experience among entrepreneurs, managers, and professionals; and continuing out-migration of the knowledge industry and other skilled workers (Newfoundland and Labrador 2006). The blueprint offered four strategic directions: 1) fostering a culture of innovation to encourage new ideas and collaboration among industry, labour, government, educational institutions, and other stakeholders; 2) positioning NL as a competitive economy with recognized international strengths and advantages; 3) broadening education and skills development and aligning skills to future economic and labour market needs; and 4) supporting enhanced R&D capacity through improved financing and investment. The Innovation Strategy prompted a series of innovation programs directed at industry and academic partners. With oil revenues rising after 2007, new funding flowed to Memorial and CNA, the RDC was founded and provincial dollars were used to leverage federal research funding on innovation in oceans, mining, and oil and gas. One issue from the RDC era was that the policy instruments were never formally evaluated, leading to a lack of clarity as to whether these investments had the impact intended.

Despite best efforts, the economy remained largely resource based and continued to ship mostly unprocessed oil, ore, fish, and lumber during this period. Towards the end of the PC era, oil revenues began to fall and a new round of fiscal restraint and budget deficits emerged. Williams copied the top-down, charismatic leadership of Joey Smallwood, Peckford, and Tobin. In addition to his resource focus, he made no effort to decentralize decision making. Then, when

the Harper government cut federal funding to regional economic development organizations in 2012, the provincial government under Premier Kathy Dunderdale immediately cut support to the REDBs. As Hall et al. (2017) argue, the demise of the REDBs – created under the Liberals – shifted the governance of regional development from dysfunctional to destitute.

After 2015, Premier Dwight Ball's Liberal administration focused largely on dealing with the fiscal legacy of the PC era. The provincial government faced a fiscal squeeze through dwindling oil revenues, which dipped to $515 million in fiscal year 2015/16, mounting debt, and pressures related to financing the Muskrat Falls project. Ball's innovation policies during the first five years shifted towards strengthening the microeconomic underpinnings of firm-level growth. The policies and realigned programs of the Department of Tourism, Culture, Industry and Innovation focused on firm-level innovation and entrepreneurship, including a pilot of European-style regional innovation systems (Newfoundland and Labrador 2020).

The current provincial Liberal government's innovation policy, The Way Forward, identifies four priorities: a more efficient public sector; a stronger economic foundation; better services; and better outcomes to promote a healthy and prosperous province. In 2017, following an extensive stakeholder engagement process, the province delivered the Business Innovation Agenda, which put forward new initiatives to support the accelerated growth of key businesses, five regional innovation pilots, and a regional trade network. The goal is to enhance product development and commercialization, increase productivity through technology and lean manufacturing, accelerate business development and internationalization, and develop workforce skills and talent (Newfoundland and Labrador 2017).

The Regional Innovation Systems pilot projects, building on the European Union's Smart Specialization Strategy, is a first for North America. The adoption of this approach was a direct

result of the work of the Advancing Innovation in NL project led by researchers at Memorial University (including the authors of this Chapter; see Hall et al. 2014). The application of these pilots is a policy experiment for the province. It remains to be seen if it will be a boutique policy innovation forgotten by the next administration or if it will influence regional innovation policy going forward.

The provincial government also commissioned McKinsey & Company to make recommendations on increasing economic growth. The report, Economic Growth Strategy for Newfoundland and Labrador, was released in February 2019 with recommendations across nine priority sectors, as well as three enabling areas of investment attraction; education, skills, and workforce development; and digitization (Newfoundland and Labrador 2019b). The strategy is very much a top-down exercise, building on existing provincial strategies and initiatives, and it is unclear what policy influence it will have.

Andrew Furey became premier in August 2020 by winning the liberal leadership and was declared elected to a slim majority (22 of 40 seats in the House of Assembly) on March 27th, 2021. Furey is an orthopaedic trauma surgeon from a prominent St. John's political family. While Furey and his team did fare well with public opinion on the health impacts of covid-19, the province's fiscal situation is characterized by unsustainable budget deficits with $1.6B during the early pandemic period of 2020. The pandemic significantly hit revenues as oil prices collapsed and provincial revenues spiralled downwards. Federal transfers to individuals lessened the impact locally and the improvement in oil revenues has led to an improved budget deficit of $826M for 2021 with the liberal government projecting a surplus within five years (Government of NL, 2021). The pandemic has highlighted the dire fiscal situation and the extent of changes needed to keep the province from defaulting on its debt.

In response, an early Furey policy initiative was to launch the Premier's Economic Recovery Team (PERT) led by Dame Moya Greene, former chief executive officer of Canada Post and the Royal Mail in the United Kingdom. PERT released its final report The Big Reset in May 2021. The Big Reset (Greene, 2021) makes for grim reading, pointing to NL having the highest per capita revenues and debt of any province, the highest health care costs, the oldest population and worst healthcare outcomes. The report argues for extensive resets to governance, the economy, social programs and government finances. From the perspective of innovation policy, I highlight two elements of the report: economic transition and governance change. The report calls for a transition to a green economy and provincial climate change plans. These issues are well known, and significant discussion and debate has been ongoing including the Forecast NL discussion of local climate change impacts (Harris Centre, 2021b) and the Harris Centre Scenario Sessions on economic transitions (Harris Centre, 2021c). These discussions call for more innovation through industry, university, government and community collaboration across sectors from tourism to mining and natural resource extraction. The Big Reset acknowledges continued provincial dependence on oil revenues and the need to reduce the carbon footprint of exploration and development of new fields (Greene, 2021). For example, new oil projects such as Bay du Nord envision a small carbon and ocean footprint with fewer employees and high-tech production sites (Greene, 2021).

There is, however, also a unique opportunity to improve the governance of innovation across the quadruple helix through public debate and the potential implementation of The Big Reset (Greene, 2021). More specifically, the report envisions a smaller provincial government footprint with the recognition that the government does not and cannot do everything by itself (Greene, 2021). The report further acknowledges the role of private sector/entrepreneurs,

university/college systems, and communities in innovation and broader governance (Greene, 2021), which is in line with the thinking in this Chapter. However, the size of cuts to government required could be debilitating and there is an argument that deficits and debt are being used as an excuse to retreat from provincial responsibility through a thinly veiled neoliberal agenda. While the proposed expansion of the roles of the other quadruple helix partners is needed, as I have argued throughout this Chapter, it requires investments by the federal and provincial governments to ensure the capacity of key innovation partners to appropriately participate in the innovation ecosystem.

The shifts between PC and Liberal regimes has generated significant changes in innovation policy. As noted, the Wells Liberal government's ERC and ENL were collapsed by the Tobin Liberal government into line departments. The Dunderdale PC government then shut down the Wells government's REDBs. Similarly, the PC government's RDC, founded in 2007, was recast in 2016 by the Liberals as Innovate NL. These swings in policy have put the staying power of newer innovative policy initiatives, such as the regional innovation pilots, in doubt. Many of these swings were influenced not by any consistent policy or ideological direction, but by the "that was them, this is us" syndrome that demands change – or the appearance of change – as each government tries to make its policy mark (Greenwood 2017).

Politics has also played a major role in provincial STI policy. The federal government is a key investor, albeit with a relatively smaller footprint than in other provinces. The provincial government is the strongest and best-resourced participant in the governance structure of NL, but with weak municipal-level governance outside a handful of urban centres and no regional-level governance structures. Partly because of the overwhelming centrality of the provincial government in the ecosystem, political shifts at this level have led to wholesale changes in

policy. While the innovation literature highlights the importance of collaboration among innovation stakeholders, including governments, post-secondary institutions, industry, and community partners, the NL system is dominated by government (Hall et al. 2014). A better system of multilevel collaborative governance might support continuity (Vodden et al. 2019).

This imbalanced stakeholder dynamic is partly due to weak industry input. The predominance of small firms with limited resources to contribute to industry associations and the paucity of larger local firms make organizing input more difficult. Industry associations, community groups, and other interest groups, often starved for funding, are forced to broaden their agenda, which dilutes their focus on innovation. These actors need adequate and regular funding to mobilize support for strong, multilevel innovation policy – in the absence of strong civic associations, government is often a critical funder.

The returns on investments in knowledge infrastructure are difficult to measure and track. Most are indirect and with significant lags, so tracing impact is challenging. The oceans cluster is one example where increased knowledge infrastructure and research capacity have led to new opportunities, new funding, and increased commercialization. The early investments in federal labs, at Memorial University and elsewhere, created the base for the recent Ocean Supercluster. The big challenge is to link this to downstream commercial activity. The recent Ocean Startup Project's Engage Cafés events to link the supercluster to entrepreneurs is one attempt to broaden the impact. Memorial and the province's college system, despite significant investments, are suffering from a lack of infrastructure renewal and aging assets. The weaker fiscal situation in the province due to lower oil revenues could create a significant policy challenge for sustaining and renewing capacity.

As noted earlier, NL has a strong culture, attachment to place, and high scores on happiness and resilience. While these indicators are positive, out-migration remains high. In addition, while the indicators suggest people are committed to local success, this has not led to a stronger economy through innovation and commercialization. Walsh and Winsor (2019) argue that NL has good ideas and great people, but poor commercialization skills. Commitment to place can provide a cultural underpinning for innovation, but it has yet to be harnessed fully (Vodden et al. 2019). Building a culture of innovation and entrepreneurship alongside, and inspired by, culture and commitment to place is needed.

Over time, the oil-fuelled boom in private sector activity, university, and college R&D and the more recent focus on ocean technology changed the innovation culture of NL, particularly in the Northeast Avalon region around St. John's. Post-secondary graduates during the boom enjoyed work-term placements in Houston, Calgary, Aberdeen, and beyond, where they graduated into six-figure salaried positions and benefited from mentors who are worlds away from the historic model of business success based on government contracts and patronage. Larger-than-life charismatic politicians and system-serving controlling bureaucrats have little place in the consciousness of these new entrepreneurs, tech specialists, and corporate managers who understand global supply chains and global finance. This could signal a shift in the politics of STI policy in NL.

In this Chapter, I have outlined several key ideas driving provincial policy over the past thirty years. The first of these is resource nationalism: the fight for control over offshore resources, including the fishery and oil. This collectivist spirit to become the primary beneficiary of provincial resources, mobilized by the Atlantic Accord, generated massive financial benefits that helped develop significant research capacity at CNA and Memorial and strengthen the

entrepreneurial class in industry supply chains. Connected to this has been a cultural reawakening in the province and a growing confidence in its ability to succeed. However, decisions such as the Sprung greenhouse and Muskrat Falls remind everyone that large investment decisions aimed at greater self-sufficiency can fail spectacularly if not carefully thought through. As in other provinces, there has been a championing of entrepreneurship, but it has been perhaps too specifically connected to technology start-ups and has had less impact on resource industries. Championing a culture of entrepreneurship is critical to embracing innovation fully.

In examining the interests of key actors, I argued that the provincial government has been a dominant player at the expense of other members of the innovation ecosystem. This has been tied to charismatic leaders and top-down agendas. Recent studies on innovation stress the social nature of innovation and note that a flourishing ecosystem requires input across governments, universities/colleges, industry, and community – that is, the quadruple helix. NL has weaker industry and community capacity and needs to strengthen these critical components of civil society. This is why I have stressed the importance of the Regional Innovation Systems pilots currently under way, as they prioritize broader community consensus while promoting entrepreneurial discovery linked to academic institutions. The goal is more diffused power across a wider variety of actors and groups at the regional level.

Finally, the province is still in "institutional building mode" and perhaps behind other provinces with respect to institutional strength beyond the provincial and federal governments. The university and college systems have benefited from significant investments, are regionally embedded in the economy, and are well positioned to support innovation across key sectors. The contributions of oil and gas, oceans, and tech start-ups have been particularly significant. Having

said this, both Memorial and CNA need to become more flexible and nimbler to support industry applied research and training needs. Industry associations are growing and have been asserting more influence on the innovation agenda, championing lean manufacturing, tech start-ups, human resource constraints, and innovation initiatives, but they continue to need strong government support due to weak membership of mostly smaller firms. Perhaps the biggest gap is the lack of regional voices at the community level. Regionalization has been discussed for a long time and championed by Municipalities NL, but little has been achieved since the demise of the Regional Economic Development Boards.

## 4. Conclusions and Lessons

Newfoundland and Labrador has a distinct Atlantic Canadian advantage in major offshore oil and mining, with beneficiary agreements providing large budgets earmarked for innovation. There have been some key successes in this area, including the examples of SubC, Kracken Sonar Systems, and Provincial Airlines (Stantec Consulting 2019). Nevertheless, these benefits agreements could be better used to drive new intellectual property and new secondary processing capacity in the resource sectors, which would pull the province out of the staples trap. The benefits agreements could be aligned to leverage other financial resources for R&D, including the federal government's capacity through the Tri-Agencies, ACOA, line departments, and special initiatives. They could also align better with the provincial TCII and Innovate NL.

The provincial focus on building entrepreneurship, coupled with investment in knowledge infrastructure, through Genesis and MCE in St. John's and Navigate on the west coast, has assisted highly motivated entrepreneurs, particularly from Memorial University. The doubling of engineering students, research intensification, and graduate program expansion,

coupled with an entrepreneurial focus, is generating some success in the knowledge economy. A small but vibrant group of entrepreneurs is succeeding within emerging entrepreneurial ecosystems (CBC 2019). Where policies are aligned effectively, there is immense potential to support entrepreneurial place-based innovations, as I see in cases such as Anaconda, the Fogo Island Inn, or Verafin. Despite some successes and encouraging signs, however, Walsh and Winsor (2019, p. 278) conclude that the province is "impeded from embracing the benefits of innovation-driven entrepreneurship as a means of fostering economic development." They argue that innovation-driven entrepreneurial activity in NL is lower than in the rest of Canada due to enduring socio-cultural factors.

The challenge for Newfoundland and Labrador is to build and implement sound policy and practice with respect to science, technology, and innovation, based on collaboration among key institutions and partners. Studies such as the Harris Centre's Advancing Innovation in NL offer guidance to policy makers, recommending that quadruple-helix partners spur new joint initiatives with distinct roles for a wide range of interests (Hall et al. 2014). These studies influence new efforts by key partners, including the provincial government's Regional Innovation Pilots, but more is needed. Innovation policy has also sometimes suffered under charismatic politicians. The lack of continuity on innovation policy arguably can be connected to political shifts, where strong leadership styles snuff out the social underpinnings of innovation. Pendulum swings due to partisan interests, however, would be harder to sustain if the innovation ecosystem were to become truly a four-part partnership.

Overall, the evidence that innovation is taking root in the province is mixed, with plenty of missed opportunities, but also glimmers of hope. Newfoundland and Labrador has great potential to use a combination of financial resources (often from resource-based industries) and a

growing group of younger entrepreneurs ready to engage. Yet, the province has not fully embraced an entrepreneurial culture, and there is only weak networking among key ecosystem participants. It is imperative, therefore, to enhance a culture of entrepreneurship and build more strategic networking among key stakeholders in the innovation ecosystem, particularly given the current decline in the offshore oil and gas industry and the resulting effects on the provincial economy, coupled with a decline in mobile work associated with the oil and gas downturn in Alberta.

Given these realities, which have been intensified by the global pandemic, innovation actors in NL need to focus on new opportunities for science, technology, and innovation. In particular, there is real opportunity for investments in the sector that build on local knowledge related to cold oceans and Arctic science and the industry know-how developed in the province. For example, value-added innovation in the fisheries could provide a competitive advantage for the province – with similar circumstances, Iceland has supported turning fish waste into leather, pharmaceuticals, and skin care products (CBC, 2017). The St. John's region, in particular, is seeing vibrant activity in the tech sector, as new grads, experienced knowledge workers, and entrepreneurs look for opportunities in the face of the post–oil boom. The challenge is to link these actors to traditional sectors beyond St. John's and to apply their knowledge and skills in new, expanding areas such as green technology and alternative energy.

**References**

Adner, R. & R. Kapoor. 2010. "Value creation in innovation ecosystems: how the structure of technological interdependence affects firm performance in new technology generations." Strateg. Manag. J. 31(3), 306–333.

Bernard, J.T. 2012. The Canadian Equalization Program: Main elements, achievements and challenges. The Federal Idea: A Quebec Think Tank on Federalism. Available at: https://ideefederale.ca/documents/Equalization.pdf

Canadian Broadcasting Corporation. 2017. "Fish skin for fashionistas: How this clever leather is hooking customers" CBC News, November 17. Online at https://www.cbc.ca/news/canada/newfoundland-labrador/eye-on-iceland-fish-skin-leather-1.4399985

Canadian Broadcasting Corporation. 2019. "N.L. tech startups had a wildly successful 2019. Can they keep it up?" CBC News. Available at: https://www.cbc.ca/news/canada/newfoundland-labrador/tech-startups-2019-nl-1.5401391

Canadian Broadcasting Corporation. 2020. "Nasdaq buying N.L. online security company Verafin in $2.75B US deal" CBC News. Available at: https://www.cbc.ca/news/canada/newfoundland-labrador/verafin-nasdaq-deal-1.5807866

Carter, K. L. & K Vodden, K. 2017. "Applicability of territorial innovation models to declining resource-based regions: Lessons from the Northern Peninsula of Newfoundland." The Journal of Rural and Community Development, 12(2/3), 74-92.

Close, D. 2007. "The Newfoundland and Labrador Strategic Social Plan: The Life Cycle of an Innovative Policy." Prepared for presentation to the Midwest Political Science Association 2007 Conference, Chicago, IL. Available at: http://www.envision.ca/pdf/cura/CloseMPSA2007_final.pdf

Coldwell Banker Richard Ellis (CBRE). 2019. Scoring Canadian tech talent. Available at: https://researchgateway.cbre.com/Layouts/GKCSearch/DownLoadPublicUrl.ashx

Collins, J. F. & S. Reid. 2015. “No More Giveaways! Resource Nationalism in Newfoundland: A Case Study of Offshore Oil in the Peckford and Williams Administrations.” Newfoundland and Labrador Studies 30(1). Available at: https://journals.lib.unb.ca/index.php/NFLDS/article/view/24519

Dewolf, G., McNiven, J., & McPhail, D. 1987. “ACOA in an international and historical context.” Canadian Journal of Regional Science XI(2), 313-325.

Dunn, C. 2005. “Why Williams walked, why Martin baulked: the Atlantic Accord dispute in perspective.” Policy Options 26(2), 9-14.

Feld, B. 2012. Startup Communities: Building and Entrepreneurial Ecosystem in your City. Hoboken, New Jersey: Wiley.

Foray, D, Goddard, J, Xabier, G. B., Landabaso, M., McCann, P., Morgan, K., Nauwelaers, C. & Ortega-Argilés, R. 2012. Guide to Research and Innovation Strategies for Smart Specialisation (RIS 3). Luxembourg: European Union.

Government of NL. 2006. Innovation Newfoundland and Labrador: A blueprint for prosperity. Available at: https://www.tcii.gov.nl.ca/innovation/pdf/full_report.pdf.

Government of NL. 2017. The Way Forward: Business Innovation Agenda. Available at: http://www.nlinnovationagenda.ca/pdf/business_innovation_agenda.pdf.

Government of NL. 2019a. Budget 2019: the Economy. Available at: https://www.gov.nl.ca/fin/files/e2019-theeconomy2019.pdf.

Government of NL. 2019b. Economic Growth Strategy for Newfoundland and Labrador: Recommendations to the Government of Newfoundland and Labrador. Available at: https://www.fin.gov.nl.ca/fin/publications/pdf/MCK_Final_Report.pdf.

Government of NL. 2020. Implement Regional Innovation System Pilots. Available at: https://www.gov.nl.ca/thewayforward/action/identify-five-regional-innovation-systems-pilot-project-areas/.

Government of NL, 2021. Budget 2021: Change starts here. Department of Finance. Available at https://www.gov.nl.ca/budget/2021/what-you-need-to-know/budget-highlights/

Greene, M. 2021. The Big Reset: Report of the Premier's Economic Recovery Team. May 2021. Available at https://thebigresetnl.ca/wp-content/uploads/2021/05/PERT-FullReport.pdf

Greenwood, R. 2017. "Managing the impacts of openness on island economies." Islands Economic Cooperation Forum Annual Report on Global Islands 2017. Island Studies Press: University of Prince Edward Island.

Greenwood, R. & Hall, H. 2016. "The social dynamics of economic performance in St. John's: A metropolis on the margins." In D.A. Wolfe and M.S. Gertler (Eds.), Growing urban economies: Innovation, creativity, and governance in Canadian city-regions (pp. 363-388). Toronto: University of Toronto Press.

Greenwood, R., Pike, C. & Kearley, W. 2012. A Commitment to Place: The Social Foundations of Innovation in Newfoundland and Labrador, St. John's: Harris Centre.

Hall, H.M & Vodden, K. 2019. "Learning, knowledge flows, and innovation in Canadian regions." In K. Vodden, D.J. Douglas, S. Markey, S. Minnes, & B. Reimer (Eds.), The theory, practice, and potential of regional development: The case of Canada (pp. 183-211). New York and London: Routledge.

Hall, H.M., Vodden, K, and Greenwood, R. 2017. "From Dysfunctional to Destitute: The Governance of Regional Economic Development in Newfoundland and Labrador." International Planning Studies, 22(2): 49-67.

Hall, H.M, Walsh, J., Vodden, K., & Greenwood, R. 2014. Challenges, opportunities and strategies for advancing innovation in Newfoundland and Labrador. Final Report of the Advancing Innovation in Newfoundland and Labrador Project. St. John's, NL: Harris Centre.

Harris Centre. 2006a. Federal government presence in Newfoundland and Labrador: Final report. St. John's, NL: Harris Centre. Available at: https://www.mun.ca/harriscentre/reports/research/2006/federalpresence/HC_FP_FINAL.pdf

Harris Centre. 2021a. Session 2 Climate Change Impacts and Actions in NL. Forecast NL. March 10. Available at https://www.harriscentreforum.ca/forecast-nl/forum_topics/session-2-climate-change-impacts

Harris Centre. 2021b. Scenario Sessions. Available at https://www.mun.ca/harriscentre/whatwedo/publicpolicy/scenariosessions.php

Hewitt, C.M., Haan, M., & Neis, B. 2018. Interprovincial Employees from Newfoundland and Labrador. On the Move Partnership. Available at: http://www.onthemovepartnership.ca/wp-content/uploads/2019/01/NL-IPE-Final-web.pdf

Higgins, J. 2012. Cultural renaissance. Heritage Newfoundland and Labrador. Available at: https://www.heritage.nf.ca/articles/politics/cultural-renaissance.php

Hiller, James K. 2007. "Robert Bond and the Pink, White, and Green: Newfoundland Nationalism in Perspective," Acadiensis 36, 2: 113–33.

House, J.D. 1999. Against the tide: Battling for economic renewal in Newfoundland and Labrador. Toronto: University of Toronto Press.

Lepawsky, J., Phan, C. & Greenwood, R. 2010. "Metropolis on the margin: Talent attraction and retention to the St. John's city-region." The Canadian Geographer, 54(3), 324-46.

Mankin, J. 1995. “Technology Readiness Levels.” Online at https://aiaa.kavi.com/apps/group_public/download.php/2212/TRLs_MankinsPaper_1995.pdf, accessed 8 December 2020.

Masoudi, N. 2017. Oil and gas development in Newfoundland. Paper presented at the Norwegian School of Economics (NHH) and Memorial University of Newfoundland Joint Workshop on Offshore Oil & Gas Development, St. John’s, NL. Available at: https://www.mun.ca/econ/more/events/Nahid_Masoudi_Nor_M2017.pdf.

Memorial University. 2019. Historic Growth: Graduate student applications, enrolment grow at record pace. Gazette. Available at: https://gazette.mun.ca/campus-and-community/historic-growth/

Memorial University. 2020. “Primer on Indigenous Peoples and protocols in Newfoundland and Labrador”. Available at: https://www.mun.ca/research/Indigenous/primer.php

Newfoundland and Labrador Association of Technical Industries (NATI). 2020. Facts and figures. Available at: https://www.nati.net/facts-and-figures/.

Nunacor. 2020. “About Nunacor.” Online at https://www.nunacor.com/about-nunacor/

Reimer, B. & Bollman, R. 2010. “Understanding rural Canada: Implications for rural development policy and rural planning policy.” In D. Douglas (Ed.), Rural planning and development in Canada p. 10-52. Toronto: Nelson Education Ltd.

Schroeder, W. & Hallett, B. 2019. “Newfoundland and Labrador needs Ottawa’s help, soon.” The Globe and Mail, November 22. Available at: https://www.theglobeandmail.com/business/commentary/article-newfoundland-and-labrador-needs-help-soon/

Shearmur, R. 2010. Maritime clusters: A comparative perspective. Leslie Harris Centre ofRegional Policy and Development, Memorial University, Synergy Session, with Oceans Advance, June 9.

Simms, A. & Ward, J. 2016. Regional Projections for Labrador & the Northern Peninsula. Report Prepared For The Leslie Harris Centre For Regional Policy And Development, Memorial University. St. John's, NL: Harris Centre Regional Analytics Laboratory, Memorial University. Available at: https://www.mun.ca/harriscentre/PopulationProject /Final_Labrador_Report.pdf

Simms, A. & Ward, J. 2017. Regional population projections for Newfoundland and Labrador 2016-2036. St. John's, NL: Harris Centre Regional Analytics Laboratory, Memorial University. Available at: https://www.mun.ca/harriscentre/PopulationProject /Population_Projections_for_NL.pdf

Stantec Consulting Ltd. 2019. Socio-economic Benefits from Petroleum Activity in Newfoundland and Labrador, 2015-2017. Available at: http://www.petroleum research.ca/ files/files/Socio-economic%20Benefits%20from%20Petroleum%20 Activity%20in%20Newfoundland%20and%20Labrador%2C%202015%20-%202017.pdf

Statistics Canada. 2020. Canada goes urban. Available at: https://www150.statcan.gc.ca/n1/pub/11-630-x/11-630-x2015004-eng.htm

Storey, K. and Hall, H.M. 2018. "Dependence at a distance: The new single-industry community and the implications for policy." The Canadian Geographer, 62(2): 225-237.

Vodden, K., Carter, K., & White, K. 2013. A primer on innovation, learning, and knowledge flows. Prepared for Canadian Regional Development: A Critical Review of Theory

Practice and Potentials. Available at: http://cdnregdev.ruralresilience.ca/wp-content/uploads/2014/12/Innovation_Primer-WP-CRD6.pdf

Vodden, K., Douglas, D., Markey, S., Minnes, S., & Reimer, B. 2019. The theory, practice and potential of regional development: The case of Canada. New York: Routledge.

Walsh, J. & Winsor, B. 2019. "Socio-cultural barriers to developing a regional entrepreneurial ecosystem." Journal of Enterprising Communities: People and places in the global economy, 13 (3), 263-282. https://doi.org/10.1108/JEC-11-2018-0088

Warrian, P. & Wolfe, D. 2016. C-CORE as a networked industrial policy. Memorial University, COASTS Initiative, July.

Warrian, P. & Wolfe, D. 2017. Research and technology transfer at the Marine Institute, Memorial University of Newfoundland. Memorial University, COASTS Initiative, April.

Williams, R. 2019. A Future for the Fishery: Crisis and Renewal in Canada's Neglected Fishing Industry. Halifax: Nimbus.

Winsor, B. & Carter, K. 2018. Mapping Knowledge Seeking in the St. John's and Corner Brook Entrepreneurial Ecosystems. St. John's, NL: Harris Centre Regional Analytics Laboratory, Memorial University. Available at: https://www.mun.ca/harriscentre/reports/WINSOR_CARTER_ARF_15-16.pdf

## Chapter 3: Applicability of Territorial Innovation Models to Declining Resource-Based Regions - Lessons from the Northern Peninsula of Newfoundland[2]

**Abstract:** Resource dependent rural regions often struggle in the face of globalization and the movement towards a knowledge-based economy. Drawing on new regionalist literature related to territorial innovation models, this paper investigates the applicability of regional innovation systems and the quadruple helix of government, university, industry and community collaboration in innovation within the Great Northern Peninsula of Newfoundland and Labrador, a struggling rural resource-based region. The research finds key factors, including a weak and dispersed private sector and a lack of resources at the municipal level, limit the effectiveness of territorial innovation model recommendations to spur innovation. Other elements of territorial innovation models related to learning, network facilitation, increased knowledge flows and connections with post-secondary institutions, and development of a shared vision and action plan could, however, benefit the region.

**Keywords:** rural; territorial innovation models; regional innovation systems; quadruple helix

### 1. Introduction

Rural places focused on resource extraction have faced increasingly rapid change since the 1980s due to forces such as globalization and technological and ecological change. In response to this change, new regionalist approaches to development have increasingly placed regional competitiveness, and particularly innovation, at the heart of economic growth (Markey, Halseth, & Manson, 2006). New regionalist literature has primarily focused on urban areas, however,

2 This manuscript was published in *The Journal of Rural and Community Development.* Available at https://journals.brandonu.ca/jrcd/article/view/1494

paying less attention to how or if models or theories of innovation systems apply to rural and peripheral resource-based regions. Territorial innovation models (TIMs), as the innovation-based handmaiden of new regionalism, suggest for example that agglomeration economies are critical to innovation, thereby precluding rural regions from participating in a critical element of economic development and regeneration (Wolfe & Gertler, 2004). This case study of the Great Northern Peninsula of Newfoundland and Labrador, Canada, assesses the applicability of key elements of the literature around TIMs for stimulating innovation in remote rural resource-based regions, finding a weakness in the capacity of these frameworks to provide solutions.

This Chapter begins with a review of key elements of the innovation literature, including the rise of new regionalism and corresponding attention to the social and institutional dynamics of innovation and the importance of learning within regional innovation systems, all with an eye to the applicability of these ideas to rural contexts. Second, it outlines the methodology used in the study, including semi-structured interviews, case studies, and workshops. Third, it presents the findings from the research. Finally, it presents an analysis of the findings, with an emphasis on the applicability of key concepts within the TIMs literature. Overall, the lessons from this study suggest the limited applicability of TIMs to the innovation challenges of remote, rural resource-dependent areas. Some elements, such as an emphasis on the importance of collaboration between business, government, university/college, and community partners—the "quadruple helix"—to drive innovation can be problematic in remote rural regions. Instead, the authors suggest that a more appropriate strategy in regions such as the Great Northern Peninsula is to focus on strengthening regional governance capacity and a culture of entrepreneurship, in turn strengthening such multi-sector innovation collaborations over time. On the other hand, the research findings suggest that TIMs' emphasis on learning to address rapid change associated

with the knowledge-based economy applies to regions similar to the Northern Peninsula. This paper also investigates what roles regional partners, universities/colleges, and governments can and do play in supporting regional innovation in the case study area, with potential application to other remote rural areas.

## 2. Literature Review

Scholarship on innovation in regional development has noted the pervasiveness of technological change and its impacts on society. Among these impacts is a shift to a knowledge-based economy, which has led to an increase in scholarship on innovation within the field of regional development. Knowledge flows, learning, and innovation are seen as important to economic success (Wolfe, 2009). Within rural regions, knowledge flows, learning, and collaboration are critical elements needed in order to adapt to dramatic changes occurring in resource dependent economies. Based on research in Northern British Columbia, for example, Markey et al. (2006) discuss a shift from comparative to competitive advantage in rural regions of Canada. Whereas in the past comparative advantage from natural resource exploitation could be relied upon as a basis for regional development, there has been a push in the 1990s and 2000s for all regions to compete globally for market share based on strategic positioning of local assets and the attraction of highly skilled workers (Markey et al. 2006).

This focus on place-based competition has coincided with a re-emergence of interest in regionalism in the literature. This 'new regionalism' has focused on a re-emergence of the local as the appropriate locus of economic development and regional planning. TIMs, which are central to this new regionalism (Lagendijk, 1997; Moulaert & Mehmood, 2010), have focused on social networks and relationships at the regional scale as vital assets for driving learning-based

competitive advantage (MacLeod, 2001). Regional assets, local identities, and regional governance structures are seen as providers of "soft economies" of collaboration and learning (Porter, 2000), positioning regions as "key economic units in the global economy" (Florida, 1995, p. 531), as well as important to new knowledge, innovation, and policy making (Welch, 2002; Harrison, 2007).

New regionalist literature related to territorial innovation emphasizes the importance of networks or linked economic actors where trust, reciprocity, and norms spur creativity and innovation (Zirul, Halseth, Markey, & Ryser, 2015; MacLeod, 2001; Cooke & Morgan, 1998; Storper, 1997). The social nature of innovation is highlighted with a focus on collaboration among governments, industry, community, and universities (Leydesdorff, 2012; Hall & Walsh, 2013). The concept of "institutional thickness" has also been widely discussed, emphasizing the importance of the presence and effective combinations of regional institutions in fostering learning and innovation (Amin & Thrift, 1995; Rodriguez-Pose, 2013). Others stress physical proximity and relationships between actors in proximity when establishing of competitive advantage, innovation, and economic growth, and in particular through face-to-face interactions (Buenza & Stark, 2003; Wolfe, 2009). Morgan (1997) cites the regional level as the scale where interactions are sustained over time and where knowledge flows and social capital are built. At the regional scale, local actors can resist the 'slippery' spatial characteristics of investment by building 'sticky' regions of development to retain and build a knowledge-based economy (Markusen, 1996; MacKinnon, Cumbers, & Chapman, 2002). From a governance perspective, new regionalist thinking calls for collaboration among key institutional players that can include enhanced local participation to compensate for government withdrawal (Zirul et al., 2015).

One key form of the TIM is the regional innovation system (RIS). Doloreux and Parto (2005, p. 148) suggest RIS is a "normative and descriptive approach that aims to capture how technological development takes place within a territory." RIS includes relationships among key economic, political, and institutional partners in a locality which involve learning and increased knowledge flows (Doloreux & Parto, 2005). RIS emphasizes interaction and learning among a range of economic actors, including firms, industry associations, and support institutions such as governments, universities, and colleges (Hall, 2017; Rodríguez-Pose, 2013; Tödtling & Trippl, 2011; Nauwelaers, 2011; Florida, 2002). The RIS model encourages both private (e.g., workers and firms) and collective learning (e.g., through networks of firms and/or groups of support organizations) through increased knowledge flows among key actors.

Another, related example of TIMs is the 'Quadruple Helix' that encompasses: (1) government providers of policy/programs to support the region, (2) firms' research and development initiatives, (3) community and institutional support partners and (4) education and research institutions (Foray et al., 2012; Etzkowitz, 2008). Key institutions including the European Union and OECD have focused on the quadruple helix in a regional innovation approach known as Research and Innovation Strategies for Smart Specialization or RIS3. RIS3 supports a regional "entrepreneurial process of discovery" where the region undertakes a "process to discover the research and innovation domains in which a region can hope to excel" (Foray et al., 2009, p. 2). Using this approach, a coalition of business, post-secondary education institutions, governments, and other community organizations act entrepreneurially to support innovation. Entrepreneurs are seen as best suited to identify research and development and innovation specialization that might be useful to the region but the creation of new business activity is also seen as dependent on harnessing this entrepreneurial spirit across the broader

community (Foray et al., 2012; Foray et al., 2011). RIS3 strategies are described as "integrated, place-based economic transformation agendas" (Foray et al. 2012, p. 8) that drive research and development to support entrepreneurship, foster university/college connections to regions, and incorporate an inclusive regionally focused consensus-based governance structure (Foray et al., 2012). They are developed through a six-step process that includes: (1) analysis of regional conditions and innovation potential; (2) creation of a participatory governance structure that encourages local buy-in; (3) developing a shared vision; (4) identifying a small number of regional development priorities; (5) appropriate policies, and (6) an effective action plan for pursuing these priorities. The sixth step acknowledges the importance of learning and adaptation through the integration of monitoring and evaluation mechanisms into the process (Foray et al., 2012).

Common to TIMs is the recognition that rapid changes in products, processes, and conditions require a collective ability to learn, adapt and innovate. Cooke and Morgan (1998, p.17) stress that "knowledge is the most strategic resource and learning the most important process" in innovation. 'Learning regions' are described as places where broader networks stimulate capacity to experiment, innovate, and adapt to rapid change (Asheim, 1996; Florida, 1995; Morgan, 1997). Hassink (2005) suggests that learning regions can avoid "political lock-ins" and destructive regional paths that, when applied together with other political and economic motivations, can block knowledge flows and learning, and lead to missed opportunities for regional resilience and adaptation.

Some literature exists on innovation in the context of rural regions (Polèse, Shearmur, Desjardins, & Johnson, 2002; Virkkala, 2007; Lagendijk & Lorentzen, 2007; Hall & Donald, 2009; Davies, 2010a; Hall, 2017). While there is undoubtedly innovation taking place in rural

regions, these authors suggest that it is more often incremental innovation (Doloreux, 2003) and is marked by older or externally controlled sectors (Tödtling, Lehner, & Trippl, 2004; Woods, 2005). Tremblay (2005) and Gertler, Florida, Gates, & Vinodrai (2002) suggest that rural actors do not appropriately value knowledge as critical to economic growth relative to other resources. This lack of focus on learning in rural regions is problematic given the prevalence of rapid change in resource dependent economies. Another inhibitor of rural innovation is a lack of clusters in rural economies (Tödtling & Trippl, 2005). Agglomeration economies, which are thought to be critical to well-functioning clusters, rarely exist in rural areas (Wolfe & Gertler, 2004). Typical economic structures in rural areas (based on resource extraction, tourism, services, etc.) mean less access to technology (Davies, 2010a), though these sectors are becoming more technology driven. Some have argued that the quadruple helix is less relevant to rural regions where knowledge infrastructure is lacking, entrepreneurs are dispersed, or there is a weak culture of entrepreneurship (Kolehmainen et al., 2016; Skogseid & Strand, 2011). In such a situation, particular elements of the quadruple helix can be more dominant (e.g., government or support organizations), causing less than optimal outcomes such as ideas coming forward with no entrepreneurial champion to implement.

The key reasons spurring innovation in regional economies, including globalization, heightened competition, rapid economic change, and the shift to a knowledge-based economy are as applicable to rural regions as they are to urban centres. Therefore, the imperative to improve learning, knowledge flows, and innovation is important to rural and urban regions alike (Davies, 2010b). In a rural context, this can often mean a combination of incremental process innovation, buying new-to-region technology to improve efficiency and innovating in economic development processes. Network development can also mimic the effects of urban density in

rural areas (Murdoch, 2000; Visser & Atzema, 2008) and networks can act as catalysts for learning and entrepreneurial discovery.

Previous research suggests therefore that there are specific stumbling blocks in applying TIMs approaches in rural regions but also a potential for applying aspects of them within such settings. This article asks what a TIMs approach has to say about key challenges, but also opportunities faced by remote rural regions, in particular, the Great Northern Peninsula of Newfoundland and Labrador, as they struggle to sustain and develop their rural economies, a topic few studies have reviewed.

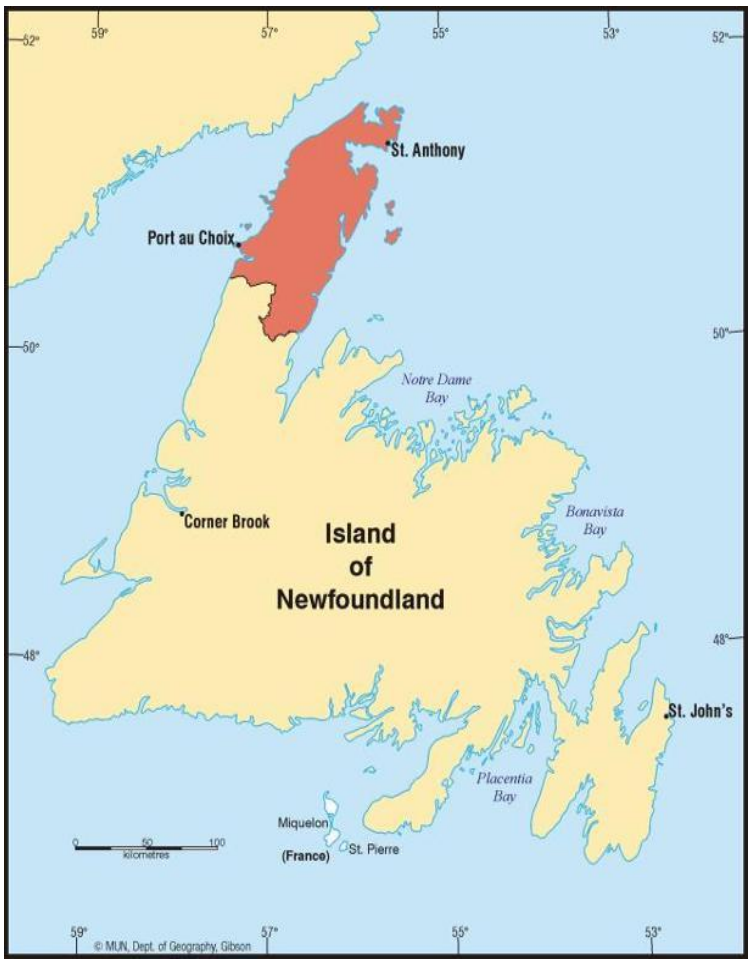
## 3. The Great Northern Peninsula

The St. Anthony – Port aux Choix region, situated on the Great Northern Peninsula of the island of Newfoundland, is a sparsely populated remote rural region in the North Atlantic. The region possesses a 4,500-year history of settlement by Indigenous people, Vikings, and most recently predominantly English and Irish Europeans (Reader, 1998; Hartery & Rast, 2003; Renouf & Bell, 2008). Described as "inhospitable" (Simms, 1986, p. 4), the region boasted vast resources of fish and forests, which brought the first European settlers in the late 1800s. Sir Wilfred Grenfell, a philanthropist, established a mission and educational and health services in the region, to improve the lives of fishermen and their families on the Northern Peninsula and Labrador in 1892 (Rompkey, 2003). He also established an orphanage and a number of cooperative ventures including a sawmill, community gardens, and handicrafts.

Since the 1992 moratorium on Northern Cod, the region (Figure 1) has faced significant challenges including population decline, above-average dependency on government transfers and an economy focused on declining primary resource extraction. The Census population for the

region in 2011 was 12,245 (Community Accounts, 2017). There was a 6.8% population decrease in the region from 20052011, while over the same period the provincial population increased by 1.8% (Community Accounts, 2017). The median age for the region in 2011 was 48, while the provincial median age was 44 (Community Accounts, 2017). The percentage of the regional labour force collecting employment insurance (EI) during the year measured at 56.5% in 2015, while the provincial level was 29.6% (Community Accounts, 2017). In 2011, 41.1% of the region's adult population did not have a high school diploma, compared to 28.0% for the province; about 6.5% of adults had a Bachelor's degree or higher, compared to 13.3% province-wide (Community Accounts, 2017). Recent projections suggest the region will lose a further 44% of its population over the next 20 years (Simms & Ward, 2016). The region is home to 51 communities, including 16 incorporated municipalities and numerous local service districts and unincorporated communities (Community Accounts, 2017). St. Anthony is the largest community, with a population of just under 2,500. Newfoundland and Labrador currently has no regional level of government.

**Figure 1: Map of the Island of Newfoundland**




Source: Ryan Gibson, *Regional profile of the Northern Peninsula Region, Newfoundland* (2013)

There is limited knowledge infrastructure in the region. A campus of the College of the North Atlantic, Newfoundland and Labrador's public community college, is located in St. Anthony and offers general first year programming and diplomas in office administration, heavy equipment operator, and powerline technician. Memorial University offers significant research and teaching services (including fishery research through the Marine Institute, outreach, public engagement and community-based research efforts conducted by faculty and graduate students with assistance through the Harris Centre of Regional Policy and Development headquartered in St. John's and Grenfell Campus of Memorial University). However, Grenfell Campus is 460 km

away from St. Anthony in Corner Brook, and Memorial's main campus in St. John's is over 1,100 km by road, or a 1.5-hour flight.

The provincial government's Department of Tourism, Culture, Industry, and Innovation (TCII) has two offices on the Northern Peninsula, offering a variety of funding for business startups, innovation, and other business programs (TCII, 2017). The federal government's Atlantic Canada Opportunities Agency (ACOA) operates from Corner Brook and offers startup, business loans, and innovation funding (ACOA, 2017). Other key regional support groups include Nortip Development Corporation (Nortip, 2017), with a loan portfolio and core funding provided through ACOA. There are three local development agencies in the region and the Viking Trail Tourism Association. St. Anthony Basin Resources Inc. is a community-based organization with an allocation of the northern shrimp quota, which is reinvested in the region (SABRI, 2017).

Primary resource extraction accounts for 24% of the regional economy, second only to sales and service (26%), with limited secondary processing (Community Accounts, 2017). Declines in the traditional fishery and forestry sectors have exacerbated economic and social difficulties. Dramatic cuts in the shrimp quotas over 2016-17 are having dramatic economic impacts, with media coverage reinforcing expectations of decline (CBC, 2016).

## 4. Methods

This study was a part of a larger project that reviewed regional development approaches in four Canadian provinces. The study was multi-faceted and qualitative in nature. It included a review of academic studies underway in the region and relevant grey literature, such as strategic plans of key organizations and reports related to economic development, as well as government statistics

related to a range of innovation indicators such as education levels and government innovation funding (White, Carter & Vodden, 2014). Additional data sources included observations from participation in local and regional meetings and in-depth interviews with local innovation system stakeholders in 2012-2014. Follow-up participation in workshops and events on the Northern Peninsula has continued since that time by the authors, including several sessions held in 2013-2017 to discuss results with regional stakeholders.

The research team used a purposive sampling approach to recruit participants who could comment on innovation efforts in the region from a business, community or government perspective. Aided by the local academic and grey literature, the research process began with a review of the local government business and community groups to create a list of potential interviewees. Input from key community leaders and economic development practitioners informed the completion of this list. This process identified a total of 25 local innovation system stakeholders from within and outside the region. Stakeholders from the business sector (including entrepreneurs from tourism, fishery, and forestry sectors), economic development support agencies, and various community organizations and government departments were invited to participate. Of the 25 participants contacted, 23 agreed to be interviewed, including eight respondents from local NGOs, six from federal, provincial, and municipal governments, seven from industry, and two from post-secondary educational institutions. These in-depth interviews were conducted both in the region and in key government offices outside the region.

Semi-structured interviews sought to gauge the level of innovation currently taking place within the region and the ways in which local and external collaboration has influenced these efforts. A final goal was to document the level of learning, evaluation and resulting changes in each organization or firm. Each interview lasted between 30 minutes and two hours. Insights

from the interviews were immediately documented through notes and summary observations. Interviews were audio-taped and transcribed verbatim, coded in NVivo and then analyzed according to a series of key themes from within the innovation literature as well as others that arose (see White et al., 2014). Data from the interviews were triangulated with insights from the additional sources noted above.

## 5. Findings

Following on key themes from the TIMs literature discussed above, the interviews with business, government, community, and post-secondary leaders provided examples of innovation in the region and focused on the role(s) of key institutions in the innovation process, the extent of knowledge partnerships and innovation collaboration, the nature and extent of collective learning processes and openness to new ideas, and challenges and barriers to innovation.

### *5.1 Collaboration and Innovation Governance*

Collaboration in the region was generally perceived as strong and valuable by those interviewed. There were examples cited of government and non-government support institutions that met regularly and shared information. As one respondent put it, "you get out of it what you put into it … if you got time and energy to invest in it you generally get good results" (leader of local community organization).

An important example of the successes of collaboration was the Northern Peninsula Business Network (NPBN), a group of businesses that had come together as a group to work on training and marketing initiatives with support from both provincial and federal governments, as well as industry associations. The Network had undertaken key initiatives for its members, including export development initiatives, lean manufacturing training, business planning support,

and joint marketing initiatives. A joint venture started among members created new employment in the region. The network was seen as a positive development but had waned over time and members no longer met as a group at the time of the interviews. Also, an ongoing network of heritage non-profit groups with a training and marketing mandate among 14 community museums and cultural spaces in the region was referenced as a positive example of collaboration (Butters, Eledi, Okusipe & Vodden, 2017).

Key challenges facing collaboration in the region were also identified, including a lack of social and business entrepreneurs being involved in collaborative efforts. As one respondent put it, “there is collaboration of facilitators and not doers” (government respondent). This barrier was framed as resulting in burnout among those who carried the burden of running key local NGOs and conducting regional development planning and, particularly, implementation. Respondents also lamented the lack of capacity among municipalities, particularly smaller towns, to play a development role, a concern also noted in the literature by Beer and Lester (2015), for example. Local representatives suggested that only the municipality of St. Anthony had paid economic development staff able to support regional development initiatives. While some smaller towns were interested and did participate, their capacity to support economic development and innovation was limited. Others showed little ability or willingness to participate in regional development and innovation initiatives.

This issue speaks more broadly of the need to get an effective mix of players at the table, as noted by authors such as Rodríguez-Pose (2013). Increasingly innovation requires the collaboration of the quadruple helix of universities/colleges, business, governments, and community partners. While respondents pointed to ongoing networking, broader quadruple helix collaboration was largely absent. One respondent explained:

> I think there's good networking taking place among businesses and community leaders in their own realm, I think the towns, municipalities, rural developers, they're doing good networking, businesses are doing good networking whether it's between businesses or in an industry, I think government within its own circles is doing good networking, but there is a disconnect between those networks (local entrepreneur).

The interviews revealed other nuances related to collaboration at the sectoral level. Within the fishery, necessity given the great distances between the region and suppliers and markets has led to the sharing of resources such as ice, equipment parts, transportation, and expertise between fish plants despite an atmosphere of fierce competition for access to scarce fish resources. One respondent in the forestry sector talked about working closely with counterparts in other provinces who were very open to knowledge sharing in both directions. However, collaboration at the industry association level was poor, with weak collaboration taking place across the province among larger forestry players. Within the tourism sector, the outfitting sector reported strong collaboration around marketing and the sharing of big game licenses, with a longstanding and active industry association. Other respondents in the tourism industry suggested there has been collaboration, but the industry has seen a loss of local planning capacity with the weakening of the local tourism association and the formation of a larger tourism group, the Western Destination Management Association (WDMO), covering a wider region. While the Viking Trail Tourism Association continues to operate and work directly with the WDMO, this is cited as a case where additional institutions (or added "institutional thickness") may have weakened rather than strengthened local development efforts (Rodríguez-Pose, 2013; Carson, Carson & Hodge, 2014; Beer & Lester, 2015).

### *5.2 Learning and Openness to New Ideas*

Learning regions require increased reflection that takes into account what is happening in the region as well as elsewhere. Monitoring and evaluation (as in the RIS3 model), is an important element to creating new knowledge from experience, as is supporting the development of individual learning so that it is built into organizational and societal learning. When asked about the status of learning within their respective institutions, most self-describe as learning organizations that reflect upon their experience and learn from mistakes. There is also generally a sense that organizations are willing to fail and try new things. While few organizations readily would acknowledge a lack of learning and reflection, there are telltale signs of weakness in this area. For example, respondents reported that few organizations outside of the provincial and federal governments had any significant budgets or access to funding for training. The interviews suggested that there was a good deal of informal learning from experience among development organizations. However, formal evaluations occurred only within government or when governments paid for them.

Pursuing adaptation and innovation based on individual and organizational learning requires openness to change. When asked about their openness to new ideas, generally, respondents said they were open to change and acknowledged the importance of new ideas to regional development. One entrepreneur talked about the need for stronger connections to the marketplace (e.g., building local tourism operators' understanding of world class sites through travel); another discussed the importance of market connections and the need to understand the sophistication of Japanese customers, who were willing to pay premium prices for quality fish products. The business respondents suggested that, without a deeper understanding of what customers were looking for, local businesses were unlikely to find market success.

Exposure to new ideas was seen by respondents as critical, as evidenced by the following observation: “we used to say the best thing for Newfoundland is put everybody aboard a boat or plane for a couple of years and bring them all back and see what happens” (local entrepreneur). On the other hand, another respondent referenced a greater openness to new ideas and wondered if this went back to Sir Wilfred Grenfell, saying: “maybe it had to do with Grenfell…with all the people coming in from outside” (local support agency respondent). Respondents acknowledged, however, that there was much more involved in commercialization than an openness to ideas: “we’ve been getting lots of ideas but being able to implement them, that’s just different, well there’s capital, there’s support, research” (local support organization).

### *5.3 Challenges to Regional Development and Innovation*

When asked about barriers to innovation in the region respondents emphasized two critical issues: first, the distance to markets and the size of the region; and second, outmigration and demographic change. One government respondent said: “the long distances, the travelling…I just got wore out travelling” (government employee). Another business person said: “a disadvantage of course we’re so far away from the marketplace and getting things in is difficult and expensive” (local entrepreneur).

The second major barrier to innovation cited by respondents was the low population and outmigration, particularly the loss of young people and lack of entrepreneurs. There was a concern that the region has many dying communities with no young people left and no future, particularly in the smaller outlying communities. Private sector respondents highlighted the lack of skilled labour as a barrier to innovation. One respondent stated: “I think the biggest problem anybody is going to have now is getting employees” (local entrepreneur). Another human

resource issue noted is the so-called 'employment insurance (EI) trap' which refers to a culture and lifestyle of seasonal work, involving working for enough weeks to qualify for EI and then living on a subsistence economy for the rest of the year to supplement the EI payments. When firms want to keep people on for longer time frames, there can be resistance among some employees that leads to human resource challenges for local companies. This seasonal nature of the economy can be a detriment in another way as well. The fishery needs to attract a younger skilled workforce but can have difficulty due to the seasonal nature of the industry, which can hold back innovation in the industry. One fish plant manager explained of smart, bright post-secondary graduates that "can do all these things and you put something like that plant in their head and they can go and do amazing stuff with it" are often not interested in seasonal low-wage jobs. Others referenced the need to build a stronger culture of entrepreneurship. There was a broad consensus that there were not enough entrepreneurs in the region and that the innovation skills of entrepreneurs and their staff could be improved, particularly around commercializing new products, understanding market opportunities, and connecting to the latest research and development in the industry.

In a recurring theme, respondents cited the lack of strong local governance, particularly at the municipal and regional level, as a barrier to innovation. The elimination of the Regional Economic Development Boards meant fewer staff whose job it is to design and implement strategies for the region. One tourism entrepreneur discussed the need for a regional vision that has broad support, with key government and non-government support agencies working to implement this vision (again as recommended in the RIS3 approach). Several respondents mentioned a need for greater regional collaboration among municipalities, further regionalization of services, and a greater municipal role in regional development processes. Respondents see

municipalities as an example of potential doers, as opposed to senior government development staff, perceiving that municipalities were well positioned to champion and lead initiatives and projects if they had the human resources capacity to do so.

Infrastructure issues raised by respondents were many and varied. Broadband and cell coverage in the region were raised regularly as key barriers to innovation. Lack of high-quality wharves and roads were also raised. Respondents were positive about the recent and ongoing development of the harbor in St. Anthony and the accompanying potential to link the region to European and North American markets for natural resource and other products through Iceland's transportation firm Eimskip, which also manages a large cold storage facility in St. Anthony. However, the need for new infrastructure in other areas was cited as a barrier to economic growth. The lack of knowledge infrastructure in the region was also seen as a problem, although the CNA campus in St. Anthony is viewed as important to the region and most businesses and groups cited examples of collaboration with the campus.

### *5.4 Fostering Innovation*

A key finding was that local partners needed to reach out to external knowledge support to foster further innovation. Respondents across all sectors mentioned the importance of new research and assistance with research, for example, particularly in knowledge-based sectors such as cultural and natural tourism but also in the exploitation of new species such as whelk in the fishery and new forest products. Several respondents noted the importance of past research to the tourism and fishery sectors (e.g., archeological discovery of Vikings, Dorset, Paleoeskimo sites, among others). Generally, it was thought that post-secondary knowledge partners could do a better job of aligning their research to local needs, although ongoing research support through these

institutions was acknowledged. Yaffle (https://mun.yaffle.ca), a knowledge and research brokering tool operated by the Harris Centre at Memorial's St. John's Campus, was cited by multiple respondents, for example, as important for local partners to access research capacity for regional initiatives.

Another key finding was that respondents felt that funders needed to broaden the definition of innovation in rural areas to include adapting technology and processes that were new to the region as legitimate regional innovation. Generally, respondents were not focused on radical new-to-world innovations. Business respondents supported adapting readily available technology in the region and incremental improvements to their operations. Examples of this sort of incremental innovation were cited in the fishery, forestry, and tourism sectors. While there was no consensus among government respondents on providing funding for adapting current off-the shelf innovations and technology from elsewhere, many social and businesses entrepreneurs expressed the value of this kind of support.

As discussed above, previous research (e.g. Markey et al. 2006, Porter 2000) suggests the importance of identifying and building on local assets for place-based competitiveness. Respondents discussed regional assets including natural resources like fish and forests, but also cultural and heritage resources such as the UNESCO world heritage site at L'anse aux Meadows, where Vikings landed 1,000 years ago. The people and their commitment to place and government and local institutions supporting business, were also mentioned. As one respondent put it, "ACOA supported me and … Industry Trade and Rural Development [now TCII], they're really good, they still support me in marketing and the people working for them are really good because they're on the local level and they understand what's going on locally, so that's a big plus" (local entrepreneur). Finally, several interviewees suggested that the size of operations in

the region were right for niche markets. Given the size of the communities in the region, smaller business operators could have significant impact on employment and, therefore, the sustainability of the region. Respondents suggested that, in this way, smaller secondary processing fish plants, non-timber forest producers, and small tourism businesses were seen as a good fit with the region. Fostering innovation in the region will require recognition of these local assets and small-scale niche strategies to build upon them.

## 6. Analysis and Conclusion

The goal of this article was to review the applicability of key elements of TIMs, particularly RIS and the quadruple helix and their dimensions of learning and collaboration in innovation at the regional scale, in a struggling rural resource-based region. The literature on such regions is weak, with more research needed. The themes of TIMs investigated through this research include the level of collaboration among elements of the quadruple helix of university, government, industry, and community and related issues of institutional capacity, as well as the state of learning and knowledge flows at multiple scales required to spur innovation and adaptation.

This research adds to studies by authors such as Kolehmainen et al. (2016) that have questioned the applicability of 'quadruple helix' collaboration within rural regions with weak knowledge infrastructure and the lack of a strong entrepreneurial culture.

Our findings suggest that collaboration in innovation processes in the region is mixed. The study region has seen collaboration among government employees and local economic development NGOs, but other key partners are often missing, most notably municipalities and the private sector, both of which could play an important role in fostering innovation if their capacity to do so were enhanced.

Several themes arose from the interviews around the need to strengthen the private sector and local government. First, the theme of stronger networking among entrepreneurs was raised, both within and outside the region, suggesting the need to expose firms to world-class innovation within their respective industries. Findings also noted that, while a previous business network eventually failed, the success that it experienced while it was functioning suggests that networks are indeed an important vehicle for regional growth and innovation in rural areas, as suggested by Murdoch (2000), Visser & Atzema (2008) and others. Greater understanding of the mechanisms and outcomes of collaboration among entrepreneurs through networks in rural settings where entrepreneurs are dispersed over significant distances is needed. Another issue identified was a lack of training and skills development. This is a theme that the Conference Board of Canada has highlighted across the country (Grant, 2014), and where post-secondary institutions can play an important role.

Generally, interviewees across the private sector, government, and post-secondary institutions referenced the need for stronger leadership at the municipal level, a level of institutional capacity also emphasized in recent work by Beer and Lester (2015) on institutional capacity for regional development. There have been discussions supported by Municipalities Newfoundland and Labrador, a provincial NGO that advocates for and organizes municipal governments as well as lobbies for regional governance, to form a regional level of government with the capacity to work on economic development. This seems the best option for strengthening local government leadership on the Northern Peninsula.

Without stronger local leadership from the private sector and more resources at the municipal level dedicated to planning and development, it is difficult to see how strong quadruple helix relationships can be formed. This deficit suggests that regions with a weak

private sector and limited resources at the municipal or regional government level need to tackle these issues more directly in order to take advantage of synergies among multi-sectoral collaboration between industry, government, universities, and community. Otherwise, it is difficult to see how attempts at quadruple helix collaboration will succeed under conditions where key regional partners are widely dispersed, weak, or lack resources.

In the absence of strong leadership from entrepreneurs or local governments (which have limited resources to participate), there is a heightened expectation placed on federal and provincial governments, support organizations, and post-secondary institutions. Consistent with previous research globally, post-secondary institutions were seen as important in regional development, but possibilities for greater impact were also identified. There was acknowledgement of the importance of research in the past related to tourism and the fishery, for example, but interviewees suggested the need for more research that could have economic impact in the region. The local College of the North Atlantic campus has actively partnered with local business around innovative programming, such as outfitter guiding in the tourism industry. Memorial University supports development through public engagement, research, and experiential learning initiatives from both its St. John's and Grenfell campuses, but the region's distance from both campuses is a stumbling block, and university partners currently face requests for support throughout the province with limited resources to meet these needs. In addition, while the college and university are important partners, they cannot lead local economic development and regional innovation. An important element within the RIS3 framework is entrepreneur-driven research initiatives, undertaken in partnership with research capacity (e.g., MUN and CNA) that can drive new business activity. This approach would appear to offer promise in the region.

Another possibility, which fits well with the legacy of Sir Wilfred Grenfell's regional development work in the region, is for the not-for-profit sector to lead development initiatives such as is currently done through the running of the Grenfell Historic Properties in St. Anthony. These community-led entrepreneurial initiatives can have significant economic and social impacts and partially make up for a weaker private sector as well as municipal services or programming where none exists.

Governments at all levels will also continue to play an important role. Generally, key regional stakeholders suggest that the region needs investment from the private sector and governments for basic infrastructure such as roads, broadband, wharves, tourism facilities, and other amenities in order to take advantage of economic opportunities. However, given the low population and expected further decline, it seems unlikely that significant investments across all these needs will be made. Local organizations and governments at all levels will need to work with what infrastructure currently exists and to be strategic about what new investments are requested and funded. The region must be smart about how it invests scarce financial and human resources. This suggests that more planning is needed with respect to infrastructure, and that a clear vision for the region needs to be articulated. This again suggests the application of an RIS3 type approach within this rural Atlantic Canadian setting.

While interviewees discussed learning within their organizations, not much evidence emerged about broader collective learning in the region. This collective learning is recommended in the RIS3 literature discussion around a regional "entrepreneurial process of discovery" (Foray et al., 2012). Evaluation and reflection on past practice were largely limited to federal and provincial governments and core-funded support organizations, which are few and shrinking in

number. There is clearly potential for further efforts to foster learning within rural regions as "the most important process" in innovation (Cooke & Morgan, 1998, p. 17).

There are no simple solutions to the deeply troubling challenges facing the Great Northern Peninsula region. The sum of these challenges threatens the continued existence of the region as a meaningful economic and social unit. This study reinforces previous research that suggests elements of TIMs do not apply well to struggling remote rural resource-based regions (Kolehmainen et al., 2016; Skogseid & Strand, 2011) such as the Northern Peninsula, particularly the focus on agglomeration economies and clusters and the need for strong knowledge infrastructure. This study adds to this literature by reinforcing these insights and further suggesting that quadruple helix collaboration among governments, business, university, and community requires a robust private sector and strong system of local government, neither of which currently exist on the Northern Peninsula of Newfoundland. In regions such as this strengthening weaker elements of the quadruple helix is critical before meaningful collaboration can occur. More research is needed on how to strengthen the private sector in the context of a region dependent on government, university, and support organizations. There are also opportunities for social enterprises to replace some elements of the private sector or missing local government services. The results of this research, however, suggest that other elements of TIMs including learning and improved network facilitation for increased knowledge flows, including an entrepreneurial process of discovery such as RIS3, could have benefits. As well, a formation of regional level government in the province could strengthen the smaller municipalities and unincorporated communities with limited capacity.

**References**

Atlantic Canada Opportunities Agency (ACOA). (2017). *Programs and Initiatives.* Retrieved July 10th from http://www.acoa-apeca.gc.ca/Eng/Pages/Home.aspx

Amin, A., & Thrift, N. (1995). Globalisation, institutional 'thickness' and the local economy. In P. Healey, S. Cameron, S. Davoudi, S. Graham, & A. Madani-Pour (Eds.), *Managing cities, the new urban context* (pp. 91-108). New York: John Wiley and Sons.

Asheim, B.T. (1996). Industrial Districts as "learning regions": A condition for prosperity? *European Planning Studies*, 4(4), 379-400.

Baptista, R. (2000). Do innovations diffuse faster within geographical clusters*? International Journal of Industrial Organization, 18*(3), 515-535.

Beer, A., & Lester, L. (2015). Institutional thickness and institutional effectiveness: developing regional indices for policy and practice in Australia. *Regional Studies, Regional Science*, *2*(1), 205-228. DOI: 10.1080/21681376.2015.1013150

Buenza, D., & Stark, D. (2003). *Trading sites-destroyed, revealed, restored*. Social Science Research Council working paper. New York: Columbia University.

Bunnell, G., & Coe, N. M. (2001). Spaces and scales of innovation. *Progress in Human Geography*, *25*(4), 569-589.

Butters, L., S. Eledi, O. Okusipe, K. Vodden. (2017). Engaging the past to create a new future: A comparative study of heritage-driven community development initiatives in the Great Northern Peninsula. *Journal of Rural and Community Development*.

CBC (Canadian Broadcasting Corporation). (2016). 'We've won the battle, but not the war': Inshore to get 70% of sharply reduced shrimp quota.

Available at https://www.cbc.ca/news/canada/newfoundland-labrador/we-ve-won-the-battle-but-not-the-war-inshore-to-get-70-of-sharply-reduced-shrimp-quota-1.3680072

Carson, D.A., Carson, D.B., & Hodge, H. (2014). Understanding Local Innovation Systems in Peripheral Tourism Destinations. *Tourism Geographies*, 16(3), 457-473.

Community Accounts. (2017). *St. Anthony-Port au Choix Rural Secretariat regional profiles.* Retrieved February 19, 2017 from: http://nl.communityaccounts.ca/profiles.asp?_=vb7En4WVgbWy0nI_

Cooke, P., & Morgan, K. (1998). *The associative region*. Oxford, United Kingdom: Oxford University Press.

Davies, S. (2010a). Innovative sectors in peripheral rural areas: Workshop on innovation in remote and peripheral areas. Glasgow: European Policies Research Centre. *Journal of Rural and Community Development 2, 2/3(2017) 74-92 89*

Davies, S. (2010b). *The context for innovation in peripheral rural regions*. Glasgow: European Policies Research Centre.

Doloreux, D., & Parto, S. (2005). Regional innovation systems: Current discourse and unresolved issues. *Technology and Society*, *27*, 133-153.

Doloreux, D. (2003). Regional innovation systems in the periphery: The case of the Beauce in Québec (Canada). *International Journal of Innovation Management*, *7*(1), 67-94.

Doloreux, D., Dionne S., & Jean, B. (2007). The evolution of an innovation system in a rural area: The case of La Pocatière, Québec. *International Journal of Urban and Regional Research, 31*(1), 146-167.

Etzkowitz H. (2008), *The Triple Helix: University–Industry–Government Innovation in Action*, Routledge, London.

Florida, R. (1995). Toward the learning region. *Futures, 27*, 527-536.

Florida, R. (2002). *The rise of the creative class: And how it's transforming work, leisure, community and everyday life.* New York: Basic Books.

Foray, D., Goddard, J., Landabaso, X., McCann, P., Morgan, K., Nauwelaers, C., & Ortega-Argilés, R. (2012). *Guide to Research and Innovation Strategies for Smart Specialisation (RIS 3)*. Geneva: European Commission.

Foray, D.; David, P.A.; Hall, B. (2011) Smart specialization. From academic idea to political instrument, the surprising career of a concept and the difficulties involved in its implementation, MTEI Working Paper.

Gertler, M. S., Florida, R., Gates, G., & Vinodrai, T. (2002). Competing on creativity: Placing Ontario's cities in North American context. Retrieved from www.competeprosper.ca

Gibson, R. (2013). *Regional profile of the Northern Peninsula Region, Newfoundland.* Working Paper CRD-10. Memorial University of Newfoundland, Corner Brook.

Grant, M. (2014) *Skills for business innovation success: It's people who innovate.* Conference Board of Canada. Ottawa.

Gustavsen., B., Nyhan B., & Ennals, R. (2007). Summary and conclusions: Learning from the cases. In B. Gustavsen., B. Nyhan, & R. Ennals (Eds.), *Learning together for local innovation: Promoting learning regions* (pp. 236-255). Luxembourg: Office for Official Publications of the European Communities.

Hall, H. M. (2017). Exploring Innovation in Northern Canada with Insights from the Mining Innovation System in Greater Sudbury, Ontario. *Northern Review* 45, 33-56.

Hall, H. M., & Walsh, J. (2013). *Advancing Innovation in Newfoundland and Labrador: Knowledge Synthesis*. St. John's: Harris Centre. Retrieved from

http://innovationnl.ca/wp-content/uploads/2013/08/Advancing-InnovationKnowledge-Synthesis.pdf

Hall, H., K. Vodden, and R. Greenwood (2015). From Dysfunctional to Destitute: The Governance of Regional Development in Newfoundland and Labrador. *International Planning Studies*, 22 (2) 49-67.

Hall, H. M., & Donald, B. (2009). *Innovation and creativity on the periphery: Challenges and opportunities in Northern Ontario*. Paper and Policy Report for the Martin Prosperity Institute. Toronto: Rotman School of Business.

Harrison, J. (2007). *Re-reading the new regionalism: A sympathetic critique.* Loughborough University Institutional Repository. Creative Commons. Retrieved from https://dspace.lboro.ac.uk/

Hartery, L., & Rast, T. (2003). Une structure paléoesquimaude du Dorsétien moyen à Peat Garden North au nord- ouest de Terre-Neuve. *Etudes/Inuit/Studies, 27*(1), 473-492.

Hassink, R. (2005). How to unlock regional economies from path dependency? From learning region to learning cluster. *European Planning Studies, 13*(4), 521-535.

Lagendijk, A. (1997). *Will the New Regionalism survive? Tracing dominant concepts in economic geography*. (Series EUNIT Discussion Paper Series, 10.) CURDS, University of Newcastle, Newcastle upon-Tyne.

Lagendijk, A., & Lorentzen, A. (2007). Proximity, knowledge and innovation in peripheral regions: On the intersection between geographical and organizational proximity. *European Planning Studies, 15*(4), 457-466.

Leydesdorff, L. (2012). The triple helix, quadruple helix, …, and an n-tuple of helices: Explanatory models for analyzing the knowledge-based economy? *Journal of the Knowledge Economy*, *3* (1), 25-35.

Kolehmainen, J., Irvine, J., Stewart, L., Karacsonyi, Z., Szabó, T., Alarinta, J., & Norberg, A. (2016). Quadruple helix, innovation and the knowledge-based development: Lessons from remote, rural and less-favoured regions. *Journal of the Knowledge Economy*, *7*(1), 23-42.

MacKinnon, D., Cumbers, A, & Chapman, K. (2002). Learning, innovation and regional development: A critical appraisal of recent debates. *Progress in Human Geography*, *26*(3), 293-311.

Macleod, G. (2001). New regionalism reconsidered: Globalization and the remaking of political economic space. *International Journal of Urban and Regional Research*, *25*(4), 804-829.

Markey, S., Halseth, G., & Manson, D. (2006). The struggle to compete: From comparative to competitive advantage in Northern British Columbia. *International Planning Studies*, *11*(1), 19-39.

Markusen, A. (1996). Sticky places in slippery space: A typology of industrial districts. *Economic Geography, 72*(3), 292-313.

Morgan, K. (1997). The learning region: Institutions, innovation and regional renewal. *Regional Studies*, *31*, 491-503.

Moulaert, F., & Mehmood, A. (2010). Analysing regional development and policy: A structuralist realist approach. *Regional Studies, 44*(1), 103-118.

Murdoch, J. (2000). Networks - a new paradigm of rural development? *Journal of Rural Studies, 16* (4), 407-419. *Journal of Rural and Community Development 2, 2/3(2017) 74-92 91*

Nauwelaers, C. (2011). Intermediaries in regional innovation systems: Role and challenges for policy. In P. Cooke, B. Asheim, R. Boschma, R. Martin, D. Schwartz, & F. Tödtling (Eds.), *Handbook of Regional Innovation and Growth* (pp. 467-481). Northhampton, MA: Edward Elgar Publishing.

Community Business Development Corporation (Nortip). (2017). *CBDC Nortip: Programs and Services.* Retrieved July 10, 2017 from http://cbdcnortip.ca/programs/index.html

Polèse, M., Shearmur, R., Desjardins, P. M., & Johnson, M. (2002). *The periphery in the knowledge economy: The spatial dynamics of the Canadian economy and the future of non-metropolitan regions in Quebec and the Atlantic provinces.* Montréal and Moncton: Institut national de la recherche scientfique and the Canadian Institute for Research on Regional Development.

Porter, M., (2000). Location, competition, and economic development: Local clusters in a global economy. *Economic Development Quarterly*, *14* (1), 15-34.

Reader, D. (1998). The 1997 archaeological survey of the Bird Cove area, northwestern Northern Peninsula Newfoundland. St John's, Newfoundland and Labrador, Canada: Government of Newfoundland and Labrador, Department of Tourism, Culture and Heritage Division, Culture and Recreation, Provincial Archaeology Office.

Renouf, M., & Bell, T. (2008). Dorset palaeoeskimo skin processing at Phillip's Garden, Portau Choix, Northwestern Newfoundland. *Arctic*, 61(1), 35-47.

Rodríguez-Pose, A. (2013). Do institutions matter for regional development? *Regional Studies, 47*(7), 1034-1047.

Rompkey, R. (2003). *The Newfoundland Gardien and the French Fishery*. St. John's, Newfoundland and Labrador, Canada: The Rooms.

St. Anthony Basin Resources Inc. (SABRI). (2017). *Background*. Retrieved July 10, 2017, from: http://sabrinl.com/background/

Simms, A., & Ward, J. (2016). *Rural population projections for Labrador & the Northern Peninsula*. St. John's, Newfoundland and Labrador, Canada: Harris Centre Regional Analytics Laboratory, St. John's Memorial University.

Simms, D. (1986). *Rural development in Newfoundland: "A legitimation crisis."* (Background report to the Royal Commission on Employment and Unemployment). St. John's, Newfoundland and Labrador, Canada: Government of Newfoundland.

Skogseid, I. & Strand, G.L. (2011). Rural innovation ecosystems – a challenge but possible. Conference paper presented at *Triple Helix IX International Conference: "Silicon Valley: Global Model or Unique Anomaly?"* Stanford, CA.

Storper, M., & Venables, A. J. (2002). *Buzz: The economic force of the city*. Paper presented at Druid Summer Conference: Industrial dynamics of the new and old economy – who is embracing whom? Copenhagen, Elsinore: Danish Research Unit for Industrial Dynamics.

Storper, M. (1997). *The regional world: Territorial development in a global economy*. New York: Guilford Press.

Tödtling, F., & Trippl, M. (2011). Regional innovation systems. In P. Cooke, B. Asheim, R. Boschma, R. Martin, D. Schwartz, & F. Tödtling (Eds.). *Handbook of Regional Innovation and Growth* (pp. 467-481). Northhampton, MA: Edward Elgar Publishing.

Tödtling, F., Lehner, P., & Trippl, M. (2004). Knowledge intensive industries, networks, and collective learning. Paper prepared for the 44th European Congress of the European Regional Science Association, 25-29 August 2004, University of Porto, Portugal.

Tödtling, F., & Trippl, M. (2005). One size fits all? Towards a differentiated regional innovation policy approach. *Research Policy, Elsevier*, *34*(8), 1203-1219.

Tourism, Culture, Industry and Innovation (TCII). (2017). *Regional Economic Development*. Retrieved July 10, 2017 from: http://www.tcii.gov.nl.ca/regionaldev/index.html

Tremblay, R. (2005). Introduction. *Canadian Journal of Regional Science, 28*(2), 195-196.

Virkkala, S. (2007). Innovation and Networking in Peripheral Areas—a Case Study of Emergence and Change in Rural Manufacturing. European Planning Studies, 15(4), 511-529.

Visser, E., & Atzema, O. (2008). With or without clusters: Towards a differentiated and combined network approach to stimulating innovation. *European Planning Studies, 16*(9), 1169-1188.

Vodden, K., Carter, K., White, K. (2013). *A primer on innovation, learning, and knowledge flows.* Working Paper CRD-6. Memorial University of Newfoundland, Corner Brook. Retrieved from http://cdnregdev.ruralresilience.ca/wpcontent/uploads/2014/12/Innovation_Primer-WP-CRD6.pdf

Welch, R. (2002). Legitimacy of rural local government in the new governance environment. *Journal of Rural Studies, 18*, 443-459.

White, K., Carter, K., & Vodden, K. (2014). Innovation Report: Northern Peninsula Region. CRD Report 23. Retrieved from http://cdnregdev.ruralresilience.ca/wpcontent/uploads/2013/03/Northern-Peninsula-Innovation-report_FINAL.pdf

Wolfe, D. A. (2009). *21st century cities in Canada: The geography of innovation.* The 2009 CIBC Scholar-in-Residence Lecture. Ottawa: Conference Board of Canada.

Wolfe, D. A., & Gertler, M. S. (2004). Clusters from the inside and out: Local dynamics and global linkages. *Urban Studies*, *41*, 1071-1093.

Woods, M. (2005). *Rural geography: Processes, responses and experiences in rural restructuring*. London: SAGE Publications.

Zirul, C., Halseth, G., Markey, S., & Ryser, L. (2015). Struggling with new regionalism: Government trumps governance in Northern British Columbia, Canada. *The Journal of Rural and Community Development*, *10*(2), 136-165.

## Chapter 4: Applying the Entrepreneurial Ecosystem Model to a less Favoured Region: Lessons and Policy Implications[3]

**Abstract:** This dissertation seeks to better understand the issues in applying TIMs to less favoured regions. In this Chapter I focus on entrepreneurial ecosystems by applying the model to Corner Brook, NL, a resource-based small city region on the west coast of the island of Newfoundland. The Chapter focuses on three issues related to ecosystems, the knowledge-seeking of entrepreneurs, the life cycle approach to ecosystems, and more empirical approaches to understanding ecosystems. The Chapter uses social network analysis (SNA) to map the entrepreneurial ecosystem in the region. The Corner Brook study gives insights into the application of a TIM to a less favoured region including: 1) contrary to ecosystem literature, the relations among entrepreneurs in this less favoured region are weak; 2) key support agencies including governments, the university/college system and non-profits are of central importance to the ecosystem; peer-to-peer relationships between entrepreneurs need to be strengthened to benefit the ecosystem; and underlining the need for more entrepreneurial leadership in the ecosystem. The study follows the Cukier et al. (2015) ecosystem life cycle approach to highlight ways to strengthen the evolution of the local ecosystem and investigates the applicability of the model to this resource-based context. The Chapter shows that the use of SNA methodology strengthens the investigation of the ecosystem through this empirically based methodology. Overall, the Chapter shows that while the ecosystem approach has been primarily used in tech-based urban contexts, it can be useful in supporting innovation and entrepreneurship development in less favoured regions.

[3] This project was part of a larger Atlantic Canadian study that used the knowledge seeking of entrepreneurs and other actors to map the ecosystem relationships. The project was led by Dr. Ellen Farrell of St. Mary's University.

**Keywords:** entrepreneurial ecosystems; peripheral regions; knowledge seeking; social network analysis; Indigenous

## 1. Introduction

This paper investigates the concept of entrepreneurial ecosystems and its applicability to less favoured regions, including peripheral smaller urban centres, Indigenous contexts, and rural places. Recent research has stressed the importance of viewing the entrepreneurial context through an ecosystem lens (Spigel, 2021; Audretsch, 2015). However, while significant attention has been paid to tech-based environments in larger urban regions such as Silicon Valley, New York and London (Startup Genome, 2020), less attention has been paid to entrepreneurial ecosystems in small peripheral resource-based cities, towns, and rural regions (Welter, Baker, Audretsch & Gartner, 2017). Drawing from the literature, I define entrepreneurial ecosystems as unique, complex, self-sustaining environments that support entrepreneurial activity (Malecki, 2018; Spigel, 2017; Feld, 2012). Key factors in entrepreneurial ecosystems include opportunities, skilled people, and resources (Ahmad & Hoffman 2008). Isenberg (2010) suggests that entrepreneurial ecosystems include six key areas: policy, finance, culture, supports, human capital, and markets.

I focus on three critical components of ecosystems in this Chapter. First, the knowledge-seeking of entrepreneurs; second, the life cycles of ecosystems; and third, the need for more empirical approaches to understanding ecosystems. First, entrepreneurship is a process of discovering and exploiting opportunities and, therefore, knowledge-seeking by entrepreneurs is a key part of this process. The ecosystem approach suggests that many of the solutions to entrepreneurial problems exist outside the firm in the region and beyond (Motoyama & Knowlton, 2017). Therefore, knowledge-seeking to solve entrepreneurial problems outside the

firm and region is an important component of a successful ecosystem (Alvarez & Barney, 2007; Wu and Wang, 2017). Following the knowledge-seeking of entrepreneurs provides insights into the ecosystem and relative strength of the relationships within the ecosystem (Farrell, 2017). Second, this Chapter follows Cukier et al. (2015), in understanding ecosystems as evolving through stages within their life cycle (Cukier, et al., 2015; Project Genome, 2020). The life cycle approach allows ecosystem champions to understand how to strengthen the ecosystem. Understanding where a region is in the development of its ecosystem can help build a strategy to further develop the region/ecosystem and support moving to the next phase in the life cycle (Cukier et al., 2015). Third, a critique of ecosystem models has been their lack of an empirical basis (Motoyama & Knowlton, 2017; Spigel, 2017) and therefore, this Chapter uses social network analysis (SNA) to map the knowledge-seeking behavior of entrepreneurs and other ecosystem players (governments, universities and support agencies) in order to empirically ground the ecosystem analysis of the Corner Brook region.

Better understanding the impact of entrepreneurship and entrepreneurial ecosystems is also critical to strengthening a region's economy (Audretsch, 2015). Small and medium-sized entrepreneurial firms provide 92% of non-government employment in Canada and 20-40% of provincial GDP (Government of Canada Small Business Statistics, 2016). Efforts to focus on and strengthen entrepreneurship have become an important policy tool of provincial and federal governments (Government of NL, 2017; Government of Canada, 2015). However, Motoyama and Knowlton (2017) suggest that previous territorial innovation models, including RIS as well as some more qualitative approaches to entrepreneurial ecosystems, have provided limited empirical analysis of local entrepreneurial dynamics, including the relationships among entrepreneurs as well as between entrepreneurs and other ecosystem partners.

To address the knowledge gap surrounding these relationships, as well as to broaden the use of entrepreneurial ecosystems beyond urban places and the tech sector, this study maps the entrepreneurial ecosystem of a less favoured region of Atlantic Canada with a significant Indigenous population and a history of resource dependency. There are obvious challenges within the local ecosystem of Corner Brook. For example, the region was ranked 121 out of 121 communities in a recent report (Canadian Federation of Independent Business, 2016). However, at the same time, there is significant local activity happening to invigorate the entrepreneurial ecosystem (CBC, 2019). My goal here is to analyze a less favoured region that faces significant challenges but that also has key assets and opportunities to investigate how and or whether the entrepreneurial ecosystem concept applies in this context.

This Chapter uses social network analysis to map the relationships within the entrepreneurial ecosystem of Corner Brook (Borgatti, Everett, & Johnson, 2018; Spigel, 2017; Motoyama and Knowlton, 2017). Using the Cukier et al. (2015) model, I seek to understand where Corner Brook fits in the model's life cycle approach, then look to better understand the next steps the model suggest for ecosystem development.

Previous research on the social and economic dynamics of regional development on the island of Newfoundland, such as Winsor & Carter (2018), Lam et al. (2013) and Vodden, Tucker, Gibson, & Holley (2011), have applied network analysis. This research builds on these previous studies by employing social network analysis (SNA) to map entrepreneurial ecosystem actors' knowledge seeking activity in the Corner Brook region. This quantitative social network analysis provides new insights into the regional dynamics of entrepreneurship (Farrell & Dennison, 2015; Motoyama & Knowlton, 2017). Furthermore, the results validate the Cukier et al. (2015) entrepreneurial ecosystem life cycle model, which lacks an empirical basis.

My goal in this Chapter is three-fold. First, I investigate whether an entrepreneurial ecosystem exists in the Corner Brook region; second, after demonstrating that there is an ecosystem, I seek to identify its stage of development based on a life cycle approach adapted from the tech-based Cukier et al. (2015) model. Finally, having established that Corner Brook region has a nascent entrepreneurial ecosystem, I look at how a small city like Corner Brook can move to the next stage in in its entrepreneurial ecosystem development. This paper adds to the ecosystem literature by mapping the entrepreneurial ecosystem of a small city using SNA and by applying a modified Cukier et al. (2015) model in a resource-based context. The outcomes of the study can help other less favoured regions struggling to strengthen or even acquire entrepreneurial ecosystems. The paper begins with a literature review, then outlines the methodology used. Next, I present findings from the network mapping. I then analyze and develop theory based on the research, followed by conclusions and policy implications.

## 2. Literature Review

### *2.1 Issues and Definitions*

Drawing from the literature (Malecki, 2018; Spigel 2017; Feld, 2012; and Ahmad & Hoffman, 2008), I define entrepreneurial ecosystems as self-sustaining enterprising regions that are focused on supporting entrepreneurs and where business opportunities meet skilled people, and resources.

Rural and peripheral regions are often characterized by older, externally controlled resource-based sectors with less focus on entrepreneurship and lower technology uptake (Tödtling, Lehner, & Trippl, 2004; Woods, 2005). At the same time, resource-based economies also face challenges of globalization and heightened competition (Carter and Tremblay, 2018). Walsh and Winsor (2019) found a weak culture of entrepreneurship in NL generally, which is problematic

given the importance of entrepreneurship for employment generation (Mason and Brown, 2014). This cultural issue is heightened in smaller cities and peripheral places where knowledge-seeking and technology adoption are weak and entrepreneurs are dispersed (Kolehmainen et al., 2016; Skogseid & Strand, 2011).

Additionally, the entrepreneurial ecosystem model tends to focus on successful tech-based regions such as Israel, Silicon Valley, or Toronto (Spigel, 2020; Spigel, 2017; Welter et al., 2017). Yet this model's strength is said to be of "universal applicability with regard to different regional and industrial contexts" (Schafer and Mayer, 2019: 55). This suggests a gap in terms of studies that focus on resource-based, rural, peripheral and Indigenous contexts. Indigenous peoples' greater participation in individual and social entrepreneurship is one way to support their aspirations to nationhood (Anderson, Dana and Dana, 2005) though more attention needs to be paid to developing underlying principles that better support Indigenous values, respect local knowledge and reflect a more community-based approach to entrepreneurship (Murphy, Danis, Mack & Sayers, 2020).

Strengthening entrepreneurial communities and ecosystems is seen as a potential solution to the challenges faced in these less favoured regions (Welter et al., 2017). This strategy seeks to foster a culture of entrepreneurship, build stronger networks of entrepreneurs through more activities, and ensure the participation of post-secondary institutions both in knowledge spillovers as well as feeding the ecosystem with new graduates (Feld, 2012). Similarly, the presence of regional supports to entrepreneurship has been shown to improve regional economic development (Audretsch, 2015; Ribeiro-Soriano, 2017). The entrepreneurial ecosystems approach itself points to the success of world-leading versions (see for example Acs, Stam, Audretsch, & O'Connor, 2017; Malecki, 2018), with less favoured regions falling further behind.

In the entrepreneurship literature, the ecosystem approach has moved beyond what Janssen (2009) referred to as a focus on internal factors or the individual traits of that lead to entrepreneurial success (Motoyama & Knowlton, 2017). Van de Ven (1993) looked past these individual traits to a "social system framework" to include local actors such as universities, financiers, and the capacity in the local labour market. The ecosystem approach developed from the view that entrepreneurial firms exist within a broader social context of networks and supports (Grabher & Stark, 1997) or as Stam (2015) puts it, "entrepreneurship takes place in an interdependent community of actors" (p. 2). This thinking relies on concepts of embeddedness (Granovetter, 1985) that show the complex networks of interactions in human societies whereas neo-classical economic theory is under-socialized and individualistic. Building on these shifts, Schafer and Mayer (2019) argue that the entrepreneurial ecosystem approach emerged in the US and Canada between 2006 and 2012 among business management and entrepreneurship researchers (Cohen, 2006; Isenberg, 2010; Feld, 2012), and was subsequently embraced in Europe between 2013 and 2019 with more focus on themes emerging in sociology and economic geography (Stam, 2015; Mason & Brown, 2014).

Various authors have connected the ecosystem model to regional innovation systems and the quadruple helix (i.e., interactions among firms, governments, communities, and universities) by stressing the importance of spatial and social dynamics and how these key actors interact within the region (e.g., Stam, 2017; Spigel, 2017). Ecosystems models differ from other territorial innovation models (TIMs) due to their clear focus on the entrepreneurial firm (Stam, 2015). This approach therefore represents a more direct analysis of the role of entrepreneurship on a regional level (Motoyama & Knowlton, 2017), thereby better explaining the contribution of entrepreneurs to economic growth (Audretsch, 2015). The model has been buoyed by its

seemingly universal applicability to different regional and economic environments (Schafer and Mayer, 2019).

As the entrepreneurial ecosystems literature has expanded, several major themes have emerged. Some researchers suggest a minimum threshold of activity and scale are required to call a region an ecosystem (Cukier et al., 2015; Startup Genome, 2020). Perhaps this threshold is why little has been done to apply the approach to peripheral and resource-based regional economic settings where dynamics are very different than in successful urban settings. This can preclude smaller cities and rural areas from inclusion in entrepreneurship broadly and ecosystem research in particular (Carter & Tremblay, 2017). Additionally, researchers and policy-makers have raised the issue of who "leads" ecosystems. Feld (2012) argues that entrepreneurs must be at the forefront of leading and organizing their ecosystem (also see Isenberg, 2010; Napier & Hansen, 2011). Other actors such as governments, universities, and community organizations are supporters, funders or 'feeders' (e.g., universities contributing new entrepreneurs to the system) (Feld 2012).

Another emerging discussion area relates to the types of firm researchers focus on. Increasingly, researchers suggest that entrepreneurial ecosystem policy is best focused on high-growth entrepreneurs given their strong role in employment output and economic growth (Spigel, 2020; Mason and Brown 2014; Isenberg 2011). In contrast, Stam (2015) and Welter et al. (2017) argue for the broader inclusion of entrepreneurial employees as well as innovative firms and more 'everyday entrepreneurship'. Further, there has been a focus on the role of new younger firms (i.e., less than five years old) (Motoyama & Knowlton, 2017), and the importance of recycling of entrepreneurial firms to the ecosystem (Spigel & Vinodrai, 2020). Additionally, practices of startups within ecosystems include: lean business models that focus the entrepreneur

on solving customer problems early in the startup phase (Blank 2003; Ries, 2011) with a focus on working towards a minimum viable product; digital affordances (Spigel, 2020; Autio, 2017) or the increasing importance of technical supports for startups such as Google analytics, and payment technology such as Shopify. Finally, there has been a move to devolution of policy making to regions through the new regionalism (see Chapter 3).

Criticisms of the ecosystems approach highlight the lack of quantitative evidence of relationships of actors at the micro level in ecosystems research (Motoyama & Knowlton, 2017). Earlier research has been more focused on qualitative approaches including case study as well as ethnographic and historical methods (e.g., Korsgaard, Ferguson & Gaddefors 2015). Another area of criticism of entrepreneurial ecosystems is the lack of a theoretical basis underlying the entrepreneurial ecosystems approach. Spigel (2017) argues that entrepreneurial ecosystems are undertheorized, with little evidence-based research. He suggests that ecosystem research incorporate previous work on regional innovation systems and the quadruple helix and that the entrepreneurial ecosystems approach fits within TIMs (Acs, Autio, & Szerb, 2012; Spigel 2017). In light of these criticisms, this paper has used the Cukier et al. (2015) life cycle approach in conjunction with the more quantitative methods of SNA, thereby strengthening the evidence base of this research area.

### *2.2 Ecosystem Life Cycles*

A key topic of discussion on entrepreneurial ecosystems is their evolution over time (Schafer and Mayer, 2019), with ecosystems varying considerably and depending on new startups for renewal (Malecki, 2018; Spigel & Vinodrai, 2020). An important component of understanding entrepreneurial ecosystems is where they are in their life cycle. Researchers have posited various

ways to understand the dynamics of ecosystems. Brown and Mason (2017) distinguish between embryonic and scale-up ecosystems. Startup Genome (2020) has a four-phase model that includes activation or the very early stage of ecosystem birth, the move to globalization and greater market penetration, expansion of the ecosystem, and finally the integration of the ecosystem into world value chains and stronger alignment of capacities internally. According to Startup Genome, Atlantic Canada as a whole is in the activation phase (Startup Genome, 2020). The Startup Genome model is better suited to larger, more focused, and better-resourced ecosystems. From this perspective, the Cukier, Kon and Krueger (2015) model is more suitable to the purpose and distinguishes between those ecosystems that are nascent or beginning to emerge, evolving and growing through greater interactions of actors, mature where the ecosystem is spinning out more startups and commercialization, and self-sustainable or fully able to maintain itself over a long period of time.

**Table 2**: **Cukier et al. (2015) Selected Ecosystem Maturity Factors**

| | |
|---|---|
| Exit strategies | Exit opportunities for startups |
| Entrepreneurship in universities | Ability of university alumni to generate startups |
| Access to funding | Total ecosystem investment into startups |
| Cultural values for entrepreneurship | Cultural support for startups |
| Ecosystem data and research | Ecosystem data availability and analysis |
| Specialized media | Startup experts in the local media |
| Ecosystem generations | Generations of entrepreneurs reinvesting in the ecosystem |
| Events | Level of support activities focused on startups |

The authors suggest that ecosystems transition as they develop based on the factors outlined in Table 2 above. While the Cukier et al. (2015) model appears to be a good fit for the Corner Brook region, it lacks a quantitative basis, a point made by Spigel, Harrison & Mason (2020) generally with respect to ecosystem analysis. In this way, Cukier et al. lack evidence of relationships of actors at the micro level (see Motoyama & Knowlton, 2017) within the eight

criteria for determining where an ecosystem is in its life cycle.

The contribution of this Chapter is to build on the valuable contributions made by Cukier et al. (2015) by applying their typologies of ecosystem stages in an under-researched context. Examining an ecosystem from the knowledge-seeking behaviors of key actors will allow us to draw from the much more entrenched field of firm and entrepreneurial knowledge-seeking (Alvarez & Barney, 2007). This analysis will also provide a partial picture of what actors *do* in these types of ecosystems, rather than focusing solely on the events, programs, or actors present. Recent literature suggests that the connections among ecosystem actors is an important part of better understanding its dynamics (Spigel, 2020; Motoyama & Knowlton, 2017). The additional focus on life cycles also brings to focus how ecosystems change over time and how this can be supported by ecosystem actors. This study integrates these dynamics to better understand a nascent ecosystem in less favoured, resource-dependent region and contributes to policy and practice by analyzing how these regions can evolve more mature ecosystems.

### *2.3 Knowledge Seeking Among Entrepreneurs*

The literature on ecosystems and regional innovation has shifted thinking about the importance of entrepreneurial knowledge seeking from the individual to the broader community. The traditional Schumpeterian view of entrepreneurship highlights the knowledge and skills of the individual entrepreneur (Schumpeter, 1934). More recently, entrepreneurship has been seen as a process of discovering and exploiting opportunities, therefore making the knowledge seeking behavior of entrepreneurs key to the entrepreneurial journey (Alvarez & Barney, 2007). According to the ecosystems view, many of the resources or attributes required by entrepreneurial firms exist at the regional level versus within the firm itself (Chiang & Hung 2010; Spigel, 2017), and the relational nature of these attributes reproduce the ecosystem

(Spigel, 2015). These knowledge resources reside in local and non-local supports, such as other entrepreneurs, universities, the supply chain, professionals like lawyers and accountants, and government funders. This heightens the need for entrepreneurs to be part of regional and international networks and emphasizes the importance of social capital to the entrepreneurial process (see for example: Aldrich & Zimmer, 1986; Stuart & Sorenson 2005; Korsgaard & Ferguson, 2015). Following this approach, this study examines knowledge seeking among entrepreneurs to map the entrepreneurial ecosystem of the Corner Brook region.

Studies on knowledge search by entrepreneurs underline the importance of both how and where entrepreneurs search for knowledge. Laursen and Salter (2006) focus on 'how to search', meaning the breadth and depth of searches, while Bathelt, Malmberg and Maskell (2004) focus on 'where to search', or the importance of local versus non-local knowledge. Breadth of searches suggest wider sources while depth means fewer but more intensive searches (Laursen & Salter, 2006). Wider breadth search strategies lead to greater innovation, but with decreasing returns (Ferreras-méndez, Newell, Fernández-mesa, & Alegre, 2015). 'Where to search' highlights both local networking as critical to knowledge spillovers at the local ecosystem level (Rodrıguez-Pose, 2010), as well as the importance of non-local sources of knowledge. Giuliani & Bell (2005) and Wang (2015) show that technological laggards search primarily locally, while technology leaders access more non-local sources.

The importance of examining entrepreneurship beyond the individual is confirmed through research revealing that innovation outcomes improve through the firm interacting with other ecosystem actors (Hall, Walsh, Vodden, & Greenwood, 2014; Tappeiner, Hauser, & Walde, 2008). This is due in part to the increased complexity in innovation, which limits the ability of firms to rely on internal knowledge, necessitating successful firms to engage in more

partners and knowledge sources (Wu & Wang, 2017). Therefore, Wu and Wang (2017) argue that knowledge seeking both within and outside regional ecosystems is key to innovation-driven entrepreneurship. Knowledge-seeking behaviours are connected to internal knowledge, since a firm's ability to seek, ascertain value, and use knowledge is based on what the firm already knows (Cohen, & Levinthal, 1990). This highlights the importance of a firm's capacity to understand external knowledge and guide knowledge searches (Cohen, & Levinthal, 1990; Grimpe & Sofka, 2009). The degree of relatedness between external knowledge searches and internal knowledge is important for different kinds of firms, with Wu and Wang (2017) finding that highly related knowledge (i.e., easily integrated to what the firm already knows) helps low-tech firms, while unrelated knowledge is more successful in high-tech firms.

## 3. Regional Economy of Corner Brook

The Corner Brook-Humber region consists of the City of Corner Brook, the Bay of Islands, and the Humber Valley, located on the west coast of Newfoundland, Canada. It includes the communities on both shores of the Bay of Islands and the communities between Corner Brook and Deer Lake, including Cormack and Reidville. The region encompasses most of the Corner Brook Functional Economic region (see Freshwater, Simms, & Ward, 2014), representing one of 29 small cities and regional towns in Atlantic Canada (Freshwater, Simms, & Ward, 2014). This region coincides with the lower portion of the former Corner Brook-Rocky Harbour Rural Secretariat Region.

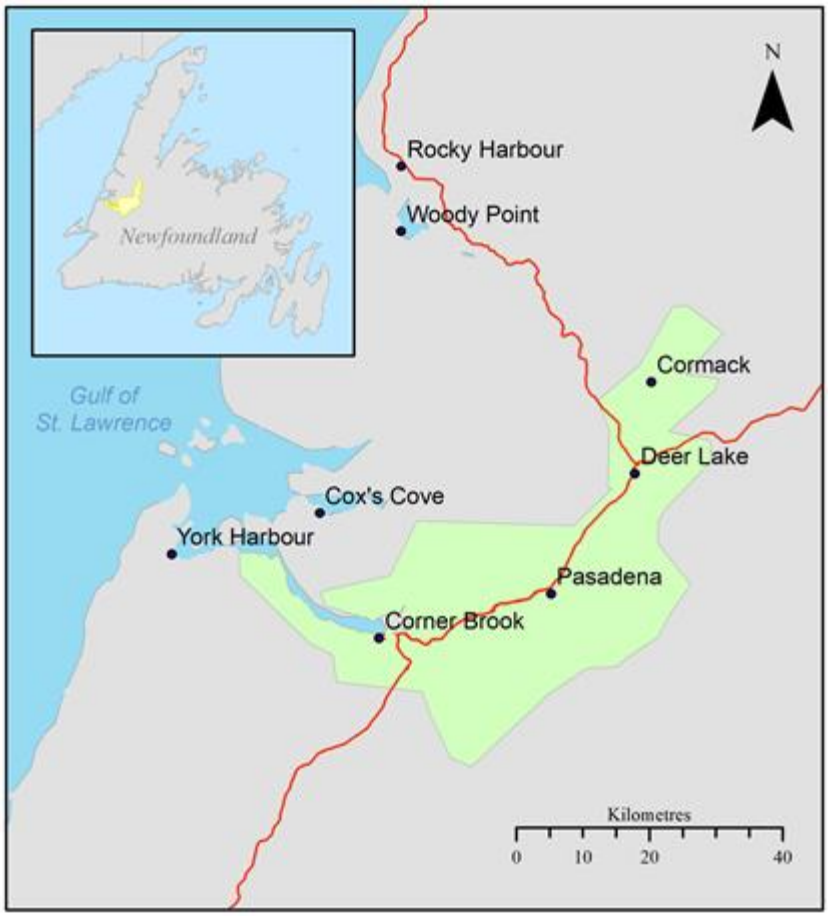



**Figure 2: Map of the Corner Brook Region**[4]

The region's history of European settlement dates to the 18th century, but permanent settlement was delayed till 1904 when France ceded control of the French Shore (Janzen, 1987). One of the world's largest pulp and paper mills was built in 1925 by Bowater Inc. When paper mills closed in Stephenville (2005) and Grand Falls-Windsor (2009), Corner Brook became the site of the province's only remaining pulp and paper mill. Corner Brook Pulp and Paper (CBPPL), owned by Kruger Inc. of Montreal, continues to operate and is the largest private sector employer in the region with a total of approximately 500 staff. The mill has faced economic uncertainty as the price and demand for newsprint has declined (CBC, 2019).

[4] Source: Myron King, Environmental Policy Institute, Grenfell Campus, Memorial University

Recently, CBPPL has been working with local university and community college campuses and government partners to develop an $8.9M Centre for Research and Innovation with the goal of strengthening the culture of innovation and entrepreneurship in Corner Brook (Government of NL, 2020).

The regional population as of 2016 was 39,003 residents (similar to the population of Charlottetown, PEI); the largest municipality is the City of Corner Brook (19,806) and the smallest is Hughes Brook (255). The regional population has grown by 1.6% since 2011. Much of this population growth has occurred in the outlying communities surrounding Corner Brook, such as Pasadena and Massey Drive, which have experienced suburban growth while Corner Brook itself has declined in population by 0.4%. Furthermore, small communities along the shore of the Bay of Islands have experienced significant population decline, with up to 5% decline between 2011-2016 in some communities. The median age of the region is 49 years, with the youngest the community of Mount Moriah (46) and the oldest being Cormack (51).

The region has a significant Indigenous population represented by the Qalipu First Nation, established in 2011 under the Indian Act of Canada. The overall federally recognized Qalipu population in NL is 23,435, though many more self-identify as Indigenous, living in 67 communities in western and central Newfoundland (Canadian Encyclopedia, 2020). The Qalipu are Mi'kmaq peoples with ancestry connected across Atlantic Canada (Canadian Encyclopedia, 2020). Qalipu Development Corporation is an independent, arms-length business mandated to manage business operations for Qalipu with the goal of long-term economic growth (Qalipu, 2020). There is also an Ulnooweg office in Stephenville that is part of an Atlantic Canadian business service operation, offering loans and other supports to member-owned businesses, and

the Qalipu Business Network also operates to support local Indigenous businesses in the region (Qalipu, 2020).

The predominant economic sectors of the region are healthcare and social assistance, which employs 17.8% of the workforce through facilities like Corner Brook Regional Hospital; retail trade (15.9%), representing the importance of Corner Brook as the regional shopping hub for the greater western Newfoundland region; construction (9.3%), fueled in part by suburban growth in outlying communities; accommodation and food services (8.2%), due to a number of hotels and other lodging options in the region; and educational services (7.4%), representing the economic impact of learning institutions like Grenfell Campus of Memorial University and the local College of the North Atlantic campus. The unemployment rate of the region is 23.4%, with Corner Brook having a lower unemployment rate of 13% and smaller outlying communities experiencing up to 36% unemployment (Community Accounts, 2021).

While Corner Brook has diversified as a regional centre through service and educational offerings, the regional economy is still resource-dependent, with weak participation in the knowledge economy and a weak culture of entrepreneurship (Walsh & Winsor, 2019). However, there have been some efforts to diversify through provincial and federal government supports and Memorial University Grenfell Campus Navigate Entrepreneurship Centre.

## 4. Corner Brook-Humber: A Nascent Entrepreneurial Ecosystem

The Cukier et al. (2015) model was discussed earlier as a tech-based entrepreneurial ecosystem model. Despite the very different context in Corner Brook, the model is useful for analyzing the region. The case region can be classified as a nascent ecosystem, based on the Cukier definition, as being one that "*is already recognized as a start-up hub, with already some existing start-ups,*

*a few investment deals, and perhaps government initiatives to stimulate or accelerate the ecosystem development, but no great output in terms of job generation or worldwide penetration.*" Employing their ecosystem life cycle model, and the metrics they deem important for a nascent ecosystem, I identified the following factors that contribute to the Corner Brook-Humber entrepreneurial ecosystem: 1) entrepreneurship in universities, 2) culture values for entrepreneurship, and 3) events. The measurement of this case is summarized in Table 3.

**Table 3: Summary of the Corner Brook–Humber Region as a Nascent Ecosystem**

| Maturity Factor | Measure | Source |
|---|---|---|
| Entrepreneurship in universities | Post-secondary population of 1,800 students, with fewer than 32 startups per year | • Startup figures from university-led entrepreneurship centres<br>• 32 (2%) startups/year threshold based on Cukier *et al.* (2015) |
| Culture values for entrepreneurship | Moderate, with the region ranking 84/121 in 2016 and 65/125 in 2018 of examined communities in Canada. | Canadian Federation of Independent Business (2016, 2018). |
| Events | Monthly events, as suggested by Cukier *et al.* (2015), including:<br>• Startup weekends<br>• Startup coffee clubs<br>• Speaker series | Website and social media pages of university, and university-led entrepreneurship centre |

The literature outlines key actors required for an entrepreneurial ecosystem including entrepreneurial firms, support organizations, venture capital/angel network presence, financial institutions, venture capital/angel investors, higher education facilities, accounting and law firms, and government agencies (Malecki, 2018; Spigel, 2017; Stam, 2015). I gathered data from local sources of these actors to measure and determine the maturity level of the focal region. Moreover, I have engaged in an active "feeder" role in the ecosystem (Feld, 2012) as local director of the local university-based entrepreneurship centre and business incubator.

## 5. Methodology

As outlined above, the research design for this work is a single-case study of a nascent entrepreneurial ecosystem, employing archival document analysis to understand the context of the case and a quantitative survey to map the knowledge seeking behaviours of 51 actors within

the ecosystem. Ethics approval to undertake the survey was obtained through Memorial University's Interdisciplinary Committee on Ethics in Human Research. I expand on the case setting below, along with a description of the methods used for the collection and analysis of the survey data. The study used a broad set of ecosystem actors from a selection of entrepreneurial firms, governments, university/college and community. The case brings quantitative methods to map the entrepreneurial ecosystem in a resource-based peripheral region.

I also sought evidence of where Corner Brook fits in the Cukier et al. (2015) model of ecosystem. First, the local post-secondary education system has begun to encourage entrepreneurship and commercial spin-offs, yet the rate of start-ups to number of students is still below the 2% threshold for nascent ecosystems (Cukier et al., 2015). With 1,800 students across the local university and public college, this would require over 32 start-ups per year. By combining reports from the local entrepreneurship centre, and business approvals from the minutes of city council meetings, I was able to determine that the region does not meet this threshold.

Second, I consulted industry reports on the level of entrepreneurial culture for this case. The region was featured in two recent reports on entrepreneurial communities in Canada for 2016 and 2018 (Canadian Federation of Independent Business (2016, 2018). These reports measured the entrepreneurial characteristics of 121 communities in 2016, and 125 in 2018. Communities are measured across 13 dimensions in the categories of presence, perspective, and policy. Corner Brook ranked 121/121 communities in 2016, and 103/125 in 2018. Therefore, I argue that the region has started from the "bottom" of the list, but it is making progress towards having a healthier entrepreneurial ecosystem.

Third, I identified the various factors that contribute to an emerging entrepreneurial ecosystem: that there were monthly events aimed at building an entrepreneurial ecosystem, primarily hosted through the university-led entrepreneurship centre and other government-funded agencies. These events featured start-up weekend events, coffee clubs, and speaker series featuring local entrepreneurs. The local economic development board also hosts events for Innovation Week and Small Business Week, which are country-wide initiatives.

I conclude that this case represents an example of a nascent but growing entrepreneurial ecosystem with government support, a limited number of university-based start-ups, an emerging culture of entrepreneurship according to industry reports, and a foundation of events on which the ecosystem can build. The case of Corner Brook is of relevance to other rural regions and smaller cities looking to learn from the ecosystem model.

### *5.1 Survey Design*

Primary data collection was based on a survey instrument developed at St. Mary's University for a broader Atlantic Canadian study of entrepreneurial ecosystems (Farrell, 2016; Farrel and Dennison, 2016), and adapted to the Corner Brook context (see Winsor & Carter, 2018). As discussed earlier, knowledge-seeking by entrepreneurs is a key component of ecosystems and this study uses this as a proxy to measure the strength the ecosystem. The study focused on four elements of actor knowledge-seeking: who was sought, the level of importance, the frequency of interactions and the type of information sought (i.e., business/market/financial information or product/scientific/technical information). Respondents were asked from whom they were seeking knowledge, and responses were sorted based on eight categories of ecosystem actors: entrepreneurial firms, support organizations, venture capital/angel networks, financial

institutions, universities/colleges, accounting firms, law firms, and government agencies. The frequency of communication (including phone, face-to-face, and electronic) was based on the previous year's activities and asked respondents to write the number of instances of communication per year. Importance of the communication was ranked using a seven-point Likert scale ranging from "low" to "high" importance. Finally, respondents were asked about the kinds of information being sought by entrepreneurial firms. The survey asked respondents to distinguish between business/market/financial versus product/service/technical information, or a combination of both. These measures of entrepreneurial knowledge seeking give evidence of where Corner Brook is in the life cycle of the ecosystem and key features outlined in the Cukier at al. (2015) model.

### *5.2 Sample*

A total of 51 surveys were completed by respondents in the Corner Brook region (35 web-hosted, and 16 through a fillable PDF sent via email). The surveys were sent in two rounds, in a modified snowball sampling process, and completed between October 2016 and June 2017. There was no single readily accessible list of ecosystem actors, so choosing potential survey respondents was based on the researchers' and key informants' knowledge of the region. Initial respondents were identified from the local entrepreneurial community followed by the local university and college campus, government officials, and entrepreneurial support organizations. One potential limitation with this process was missing key ecosystem participants in the sample, which I tried to account for by sending surveys to those identified by other respondents as key actors.

### *5.3 Analysis*

Once the surveys were complete, the responses were analyzed, and descriptive statistics were developed using Gephi software (freely available SNA software). I also employed social network analysis methodology (Blondel, Guillaume, Lambiotte, & Lefebvre, 2008; Borgatti, Everett & Johnson, 2018; Lambiotte, Delvenne, Barahona, 2015), analysing responses for the number of *nodes*, the number of *edges*, the average *frequency* of communications, and the *importance* of these communications. The number of *nodes* represents the number of unique actors recorded in the survey (i.e., individual entrepreneurial firms, support organizations, venture capital/angel networks, financial institutions, university/college/research, accounting firms, law firms, and government agencies). The *frequency* reflects the number of times people connected in the previous year, and the *importance* was measured by the significance they attached to this knowledge seeking (1=low, 7=high).

These four values allowed the calculation of the *weight, degree,* and *weighted degree* of any given node. The *weight* is the addition of the importance and frequency measures. The *degree* value is the sum of edges (in either direction i.e., inbound, and outbound) for any given node. The resultant *weighted degree* is calculated by multiplying every nodes' degree value by their respective weights.

Figure 3 below outlines the relationships in the Corner Brook regions as reflected by the survey results. The Gephi software created edges (or lines) for each interaction in the dataset showing connections between any two nodes. The nodes named by different respondents were consolidated in a map where size and centrality reflect the node's importance and frequency to knowledge seekers within the ecosystem. Each actor type was coded with a unique colour. The

resulting maps show the region's knowledge flows and highlight the central players in these knowledge flows.

**Figure 3: Social Network Analysis Map by Frequency and Importance (note this figure is attached as a separate file for better viewing).**

## 6. Results

As noted above, I received 51 survey responses with respondents naming 178 different entities or nodes (see Table 3). A total of 345 knowledge-seeking interactions (edges) were listed by respondents. The degree values ranged from 1 to as high as 85 (for the Atlantic Canada Opportunities Agency (ACOA)), with the average being 5.24.

**Table 4: Ecosystem Descriptive Statistics**

| Element | Value |
|---|---|
| Number of Nodes | 178 |
| Number of Edges | 345 |
| Average Degree (sum of edges) | 3.876 |
| Average Weighted Degree (Importance) | 10.433 |
| Average Weighted Degree (Frequency) | 5.944 |

The nature of the respondents' profession was also captured (See Table 5 for details). Respondents self-identified on this topic and could include more than one category. Most respondents were entrepreneurial firms (54.9% in Corner Brook). The next largest group was government (25.5% in Corner Brook).

**Table 5: Self Identification of Profession (More Than One Category Possible)**

| Profession | Number | Percent |
|---|---|---|
| Entrepreneur | 28 | 54.9 |
| Social Entrepreneur | 8 | 15.7 |
| Aboriginal | 8 | 15.7 |
| Venture Capitalist | 0 | 0 |
| Private Individual | 3 | 5.9 |
| Business angel network | 3 | 5.9 |
| Lawyer | 1 | 2.0 |
| Accountant | 3 | 5.9 |
| Government representative | 13 | 25.5 |
| Consultant | 2 | 3.9 |
| Journalist | 2 | 3.9 |
| Professor | 6 | 11.8 |
| Employee in a mature company | 3 | 5.9 |
| Research laboratory employee | 1 | 2.0 |
| Banker | 0 | 0 |
| Other (please specify below) | 9 | 17.6 |

Respondents reported high education levels with all but two having had some form of post-secondary education (Table 6 outlines the respondent's educational profiles). Combined, nearly a quarter of all respondents had a master's degree, while more than half had a bachelors' degree.

**Table 6: Respondent Highest Level of Education**

| Highest Level of Education | Percent |
|---|---|
| High School or Equivalent | 24 |
| Some College | 12 |
| Vocational/Technical School (2 years) | 14 |
| Bachelor's Degree | 45 |
| Master's Degree | 24 |

**Note:** Percentages will not add to 100% due to more than one response from individual respondents.

Much of the data are usefully presented on network maps or graphs (see Figure 3 above). These maps show all the nodes named by respondents and the type and direction of their knowledge seeking interactions. In these maps, centrality and node size represent frequency and importance. An examination of these maps reveals that university/college/research, government agencies, and support organizations are particularly important to the ecosystem (see Table 5). Most have large node size and are in the central portions of the maps with multiple edges going in both directions. Financial institutions are well represented, including venture capital/angel firms, and professional support firms in law and accounting were also prominent in the ecosystem (see map 1). Also noteworthy was the small number of nodes outside the region and beyond. A striking feature of the regional map (Table 7) is the often-peripheral location of entrepreneurial firms, with many located on the outer portions of the maps and with few edges to their entrepreneurial firm peers.

**Table 7: Node Type and Importance of Inward/Outward/Combined Knowledge Seeking**

| Node Type | Weighted (importance) In Degree | Weighted (importance) Out Degree | Weighted (importance) Combined |
|---|---|---|---|
| University/College/Research | 27.81 | 45.81 | 73.63 |
| Government Agency | 26.13 | 16.00 | 42.13 |
| Support Organization | 16.71 | 19.75 | 36.47 |
| Financial Institution | 27.75 | 0.63 | 28.38 |
| Venture Capital/ Angel Network | 24.29 | 2.29 | 26.59 |
| Entrepreneurial Firm | 6.26 | 13.42 | 19.68 |
| Accounting / law firm | 13.74 | 3.98 | 17.72 |

Especially noteworthy here was how little knowledge seeking occurred between entrepreneurial firms. They sought knowledge 60 times, and of these only 18 (30%) were from other entrepreneurial firms (see Table 8). Also interesting was the split between types of knowledge sought, with entrepreneurial firms seeking business/market/financial knowledge about three times more often than product/ service/technical knowledge whether the inquiry was directed at other entrepreneurial firms or any other entity (see Table 8). This suggests entrepreneurs are less technically oriented and more likely looking for funding and/or marketing support, pointing to a less sophisticated ecosystem.

**Table 8: Total Knowledge Seeking by Entrepreneurial Firms**

| | Business/ Market/ Financial | Product/ Service/ Technical | Both | Neither | Total |
|---|---|---|---|---|---|
| **All KS** | 31 (52%) | 6 (10%) | 8 (13%) | 15 (25%) | 60 |
| **E to E KS** | 5 (28%) | 4 (22%) | 3 (17%) | 6 (33%) | 18 |

**Note:** KS = Knowledge Seeking; E = Entrepreneurial Firm

## 7. Discussion

The Cukier et al. (2015) model was a better fit over other models such as the Startup Genome methodology, since this model better allows for nuance in regional place-based differences and

has applicability at a smaller scale and within smaller regions (Cukier & Don, 2018). Startup Genome's (2020) approach masks more local regional differences and operates at scale that ignores smaller places and their regional dynamics (e.g., Atlantic Canada is treated as a whole) (Startup Genome, 2020), making it less applicable in smaller cities and rural/peripheral regions.

Using the Cukier et al (2015) four stage schemata, the assessment suggests that the Corner Brook region is in the nascent stage. In the analysis of the region, I found low but increasing university entrepreneurship, low to moderate cultural values of entrepreneurship, with a growing number of events, including startup weekends, coffee clubs, and fairly regular entrepreneurship speakers.

Corner Brook had a substantial self-identification of entrepreneurs with Indigenous background. This is not surprising given the number of residents in the region who are members of the Qalipu First Nation. Indigenous support organizations, including Qalipu Development Corporation, Ulnooweg, and the Qalipu Business Network were all named by survey participants, suggesting that they are key actors in the ecosystem. While this study broadly covers the ecosystem of the region, it does not adequately investigate the Indigenous components of the local ecosystem or the internal dynamics particular to these Indigenous entrepreneurs - an area that deserves to be further researched, with particular dynamics of Indigenous ecosystems analyzed.

A local entrepreneur-driven group called Humber Valley Entrepreneurs was mentioned as a support organization. However, entrepreneurial firms sought knowledge from their peers much less than from government agencies and support organizations. Less than 25% of entrepreneurial firm knowledge seeking was to other firms (see Tables 6.0 & 6.1). Low levels of peer-to-peer knowledge seeking suggests firms in the region are lacking a crucial component of a productive

ecosystem and that they are not leading the ecosystem as suggested by key ecosystem advocates (Feld, 2012; Napier and Hansen 2011; Isenberg, 2010). This may also be caused by a culture of competition that needs to be tempered by collaboration.

The study shows significantly higher knowledge seeking behavior related to business/market/financial knowledge (55%) versus product/service/ technical (13%) (See Table 6). This may be indicating that local entrepreneurial firms are not as innovation focused as they could be, or do not have the internal knowledge needed to recognize the value of this type of external knowledge since innovation requires product/service/ technical knowledge (Cohen & Levinthal, 1990; Grimpe & Sofka, 2009; Laursen & Salter, 2006; Wang, 2011). The study also found low levels of entrepreneurial firm-to-mature firm interaction than seen in more mature ecosystems (Saxenian, 1996).

The maps show few connections between newer entrepreneurial firms and mature firms. The region's mature firms (e.g., the regional anchor firm Corner Brook Pulp and Paper or Barry Group) have significant expertise and capacity to help their region's entrepreneurial firms (Alvarez & Barney, 2001). CBPPL is also collaborating with Memorial University and the local college to build a Centre for Research and Innovation (Government of NL, 2020). Farrell (2017) has looked at the importance of mature firms to the Atlantic Canadian context and outlined ways they can support ecosystem development. These developments suggest that Corner Brook is moving in the right direction, but more can be done to include the expertise of mature firms in ecosystem activities.

There was also limited connection to venture capital, with Atlantic Canadian venture capitalists peripheral in the maps (there are no regional venture capitalists). This could change if the ecosystem matures and deal flow increases. The lack of venture capital might be partly a

function of the region's smaller size, its resource-based orientation, and weak tech sector. Nonetheless, several respondents in Corner Brook identified being part of a business angel network, a group of investors who meet regularly to identify and analyze investment opportunities in the region. These angel investor activities might compensate for the lack of venture capital funding availability in the ecosystem.

Another significant finding is the substantial presence of government agencies and support organizations in the ecosystem. These actors play central roles, as shown in centrality and node size (Figure 3), particularly the federal Atlantic Canada Opportunities Agency and multiple provincial government departments. The maps also show entrepreneurial firms seeking knowledge from the local university/college campuses and support organizations. Entrepreneurial respondents referenced the College of the North Atlantic, Memorial University's Grenfell Campus, as well as support organizations such as NL Organization of Women Entrepreneurs, Futurpreneur, and the Community Business Development Corporations. The degree of centrality and node size of governments, educational/research institutions, and support organizations reflect the frequency and importance of these connections for entrepreneurs (Figure 3). Frequent connections to government and other funders related to finding capital for entrepreneurial firms may skew the knowledge seeking to business/market/financial rather than product/service/technical.

The strong connections to governments, education/research, and support organizations observed in the Corner Brook region, coupled with the low levels of connections among entrepreneurs, is a key feature of nascent ecosystems. The stronger roles of these organizations can help the ecosystem move forward through supporting university/college entrepreneurship, holding more events, and supporting a culture of entrepreneurship. Shifting the culture is

important in a region where traditional employment, historically the presence of high-paying unionized positions at the pulp and paper mill with benefits and a pension, has been prioritized. Comparison to other nascent ecosystems would help expand on these findings, suggesting that moving to the evolving ecosystem of the Cukier et al. (2015) model will necessitate greater entrepreneurial peer-to-peer knowledge seeking to bring firms to a more central positions with greater node size (Figure 3).

This study also shows that the ecosystem has weak connections beyond the local region. The literature on innovation systems notes the importance of external connections, highlighting that a lack of these linkages can limit innovation in an ecosystem (Bathelt, Malmberg & Maskell, 2004; Rodrıguez-Pose, 2010). Survey respondents seldom referenced connections across Atlantic Canada, and even fewer referenced any to the rest of the world. While good connections to the provincial capital of St. John's were evident (across business, support and government organizations), external connections were very weak. There were a few notable exceptions, both of very well-connected individuals and to particular places. This finding of limited connections beyond the local region is consistent with the findings from similar ecosystem mapping studies in St. John's and Halifax (Winsor & Carter, 2018; Farrell & Dennison, 2015).

The Cukier et al. (2015) model lays out requirements for the evolution of entrepreneurial ecosystems. Based on their model I have labelled the Corner Brook ecosystem as nascent, and the next stage for the model is the evolving stage. Ecosystem evolution requires strengthening key areas, which I highlight for regional actors to focus for strengthening the ecosystem based on Cukier's model. First, university entrepreneurship, while an emerging strength in Corner Brook through the Navigate Entrepreneurship Centre, needs to promote and support more startups. This goal could also be facilitated through an increase in the number of entrepreneurship events held.

Second, based on the findings, connections of entrepreneurs to venture capital and angel funding is relatively weak, implying that more capital connecting events could be undertaken. Third, research has shown that cultural values for entrepreneurship are weak in NL overall (Walsh and Winsor, 2019) which is another important component in the evolution of the ecosystem and in particular the local culture of success being measured by a high paying job at the mill. Promoting entrepreneurship and celebrating local entrepreneurs can help. Fourth, ecosystems can be strengthened through more extensive data and research on the ecosystem. While this study begins to fill this gap, future research can expand on these finding, since this study had limited relevance to Indigenous entrepreneurship and only represents one period in time. Fifth, Cukier et al. (2015) suggest the creation of specialized media tools to promote the ecosystem and share information among participants, and perhaps the university and support organizations could help strengthen media tools expanded.

## 8. Conclusion

One of the strengths of the entrepreneurial ecosystems model is its widespread applicability (Schafer and Mayer, 2019). Yet, entrepreneurial ecosystem research has focused largely on the technology sector in larger cities. I expand the ecosystem model to a less favoured, resource-based, peripheral, Indigenous, and regional economic setting where dynamics are very different. In addition, this study expands the use of evidence-based ecosystem mapping by applying a modified Cukier life cycle model coupled with the use of social network analysis. This study has strengthened the Cukier et al. schema for entrepreneurial ecosystems by including an empirical component that maps the dynamics of relationships at the micro-level between entrepreneurs and

supporting organizations, thus addressing an element that was lacking in the Cukier et al. (2015) criteria for understanding the life cycle of ecosystems.

This review suggests that there is in fact an entrepreneurial ecosystem in Corner Brook and that this ecosystem is at the nascent stage. This analysis can help entrepreneurs and support organizations in the region better understand how to support the evolution of the ecosystem to progress to the next stage. I have discussed some of the strengths and weaknesses of the ecosystem and outlined key areas where the ecosystem can be strengthened and evolved including strengthening university entrepreneurship, encouraging more research into the ecosystem, supporting a culture of entrepreneurship, better connecting entrepreneurs to funding and venture capital, and better communication of success of the ecosystem.

Further research is needed on the evolution of the ecosystem by undertaking additional social network analysis to see what has changed over time. Perhaps the largest impact on the ecosystem has been Covid-19 (this research was undertaken prior to the pandemic), which represents an opportunity to reassess to see how the regional ecosystem has been affected. Furthermore, there are opportunities to specifically compare results from other Atlantic Canadian regions that have been mapped using the same social network analysis methodology developed at St. Mary's University (Farrell, 2016; Farrell and Dennison, 2016). Finally, a significant proportion of the respondents to the survey self-identified as Indigenous. While I have not delved deeply into this specifically in the findings, this points to an opportunity to undertake more focused research on the dynamics of Indigenous entrepreneurship in the region and how that can support Indigenous aspirations in ways that reflect Indigenous principles and values (Anderson et al., 2005; Murphy et al. 2020).

**References**

Acs, Z. Stam, E. Audretsch, D., & O'Connor A. (2017). The linkages of the entrepreneurial ecosystem approach. Small Business Economics: An Entrepreneurship Journal, 49(1): 1-10.

Acs, Z., Autio, E., & Szerb, L. (2012). National Systems of Entrepreneurship: Measurement Issues and Policy Implications. *GMU School of Public Policy Research,* Paper No. 2012-08, SSRN.

Ahmad, N., & Hoffman, A. (2008). A Framework for addressing and measuring entrepreneurship, OECD Statistics Working Paper No. 2, Organization for Economic Co-operation and Development.

Aldrich, A., & Zimmer, C. (1986). Entrepreneurship through social networks. *California Management Review*, 33: 3-23

Alvarez, S., & Barney, J. (2007). Discovery and creation: alternative theories of entrepreneurial action. *Journal of Strategic Entrepreneurship*, 26(November): 11-26.

Alvarez, S., & Barney, J. (2001). How entrepreneurial firms can benefit from alliances with large partners. *The Academy of Management Executive* (1993-2005), 15(1): 139.

Anderson, R. B., Dana, L. P., & Dana, T. E. (2005). Indigenous land rights, entrepreneurship, and economic development in Canada: "Opting-in" to the global economy. *Journal of World Business*, *41*(1), 45–55. https://doi.org/10.1016/j.jwb.2005.10.005

Audretsch, D., (2015) *Everything in its pace: entrepreneurship and the strategic management of cities, regions and states*. Toronto: Oxford University Press.

Autio, E., Kenney, M., Mustar, P., Siegel, D. & Wright, M. (2014). Entrepreneurial innovation: the importance of context. *Research Policy,* 43(7): 1097-1108.

Autio, E., Nambisan, S., Thomas, L. D. W., & Wright, M. (2017). Digital affordances, spatial affordances, and the genesis of entre- preneurial ecosystems. *Strategic Entrepreneurship Journal*, 12(1), 72–95.

Bathelt, H., Malmberg, A. & Maskell, P. (2004). Clusters and knowledge: Local buzz, global pipelines and the process of knowledge creation. *Progress in Human Geography*, 28(1): 31-56.

Baumol, W., & Strom, R. (2007). Entrepreneurship and economic growth. *Strategic Entrepreneurship Journal*, 1(1-2): 233-237.

Benjamin, L., Rubin, J., & Zielenbach, S. (2004). Community development financial institutions: Current issues and future prospects. *Journal of Urban Affairs*, 26(2): 177-195.

Blank, S. (2003). *The Four Steps to the Epiphany: Successful Strategies for Products That Win*. Foster City, CA: CafePress.

Bloom, N., & Dees, G. (2008). Cultivate your ecosystem. *Stanford Social Innovation Review*, 6(1): 47-53.

Blondel, V., Guillaume, J-L., Lambiotte, R., & Lefebvre, E. (2008). Fast unfolding of communities in large networks. *Journal of Statistical Mechanics: Theory and Experiment*, 10: 1000.

Borgatti, S., Everett. M., & Johnson J. (2018). *Analyzing Social Networks (2nd ed.)*. London, UK: Sage.

Bramwell. A., & Wolfe, D., (2008). Universities and regional economic development: The entrepreneurial University of Waterloo. *Research Policy*, 37(8) 1175-1187.

Brown, R., & Mason, C. (2017). Looking inside the spiky bits: A critical review and conceptualisation of entrepreneurial ecosystems. *Small Business Economics*, 49, 11–30.

Canadian Broadcasting Corporation. (2019). “Corner Brook Pulp and Paper trimming full-time staff, shutdown coming on Christmas Eve” CBC News. Available at: https://www.cbc.ca/news/canada/newfoundland-labrador/corner-brook-pulp-paper-1.5387316

Benoit, M. R. (2020). Qalipu Mi’kmaq First Nation. *Canadian Encyclopedia* Available at: https://www.thecanadianencyclopedia.ca/en/article/qalipu-mi-kmaq-first-nation

Carter, K., & Tremblay, R.C. (2017). Governance for the Rural Knowledge Economy. In: Marland, A., & Moore, L., *The Democracy Cookbook: Recipes to Renew Governance in Newfoundland and Labrador*. St. John’s: ISERbooks (pp. 81-85).

Clarysse,B., Wright, M., Bruneel, J., & Mahajan, A. (2014). Creating value in ecosystems: Crossing the chasm between knowledge and business ecosystems. *Research Policy*, 43(7): 1164-1176.

Cohen, W. M., & Levinthal, D. A. (1990). Absorptive capacity: A new perspective on learning and innovation. *Administrative Science Quarterly*, 35(1), 128–152.

Community Accounts (2018). http://nl.communityaccounts.ca, last accessed March 30, 2018.

Community Accounts (2021). Economic Zone 8 profiles. Accessed October 20th, 2021. Retrieved from https://nl.communityaccounts.ca/profiles.asp?_=vb7En4WVgb2uzqVq

Cukier D., & Kon, F. (2018). A maturity model for software startup ecosystems. *Journal of Innovation and Entrepreneurship*, 7(14), (1-32). https://doi.org/10.1186/s13731-018-0091-6

Cukier, D., Kon, F., & Krueger, N. (2015). *Towards a software startup ecosystems maturity model*. Technical report RTMAC-2015-03. São Paulo: University of São Paulo, Department of Computer Science.

Farrell, E., (2016). *Weak ties and global reach: network theory and the Atlantic entrepreneurial ecosystem*. Working Paper Series No. 2016-01. Halifax: Sobey School of Business.

Farrell, E., (2017). *The role of mature firms in an entrepreneurial ecosystem.* Conference Paper presented at the University Industry Interaction Network in Dublin, June 7-9, 2017.

Farrell, E., & Dennison, N. (2016). *Quantitative analysis of the Atlantic entrepreneurial ecosystem's innovation activities*. Working Paper Series No. 2016-03. Halifax: Sobey School of Business.

Farrell, E., & Dennison, N. (2015). *Measuring and mapping knowledge-seeking behavior in an entrepreneuriaL ecosystem*, Conference Paper submitted to Financing Knowledge Transfer Conference, Rimini, Italy, April 16, 2015.

Feld, B. (2012). *Startup communities: Building an entrepreneurial ecosystem in your city*. Hoboken NJ: John Wiley & Sons.

Ferreras-méndez, J. L., Newell, S., Fernández-mesa, A., & Alegre, J. (2015). Industrial Marketing Management Depth and breadth of external knowledge search and performance : The mediating role of absorptive capacity. *Industrial Marketing Management*, 47: 86-97.

Freshwater, D., Simms, A., & Ward, J. (2014). *Local Labour Markets as a New Way of Organizing Policies for Stronger Regional Economic Development in Atlantic Canada.* Report prepared for the Harris Centre Memorial University of Newfoundland.

Giuliani, E., & Bell, M. (2005). The micro-determinants of meso-level learning and innovation : evidence from a Chilean wine cluster, *Research Policy* 34: 47–68.

Government of Canada Small Business Statistics (2016), http://www.ic.gc.ca/eic/site/061.nsf/eng/h_03018.html; last accessed March 13, 2018.

Government of Canada (2015). Atlantic Growth Strategy. Available at: https://www.canada.ca/en/atlantic-canada-opportunities/atlanticgrowth.html

Government of NL. (2017). The Way Forward: Business Innovation Agenda. Available at: http://www.nlinnovationagenda.ca/pdf/business_innovation_agenda.pdf.

Government of NL. (2020). News Release: Centre for Research and Innovation Celebrated by Partners. Available at: https://www.gov.nl.ca/releases/2020/exec/0727n01/

Grabher, Gernot, and David Stark. (1997). "Organizing Diversity: Evolutionary Theory, Network Analysis and Postsocialism." Regional Studies 31(5):533–44.

Granovetter, M.S. (1985). Economic action and the economic structure: the problem of embeddedness. *American Journal of Sociology*, 91: 481-510.

Grimpe, C., & Sofka, W. (2009). Search patterns and absorptive capacity: Low- and high-technology sectors in European countries. *Research Policy*, 38(3): 495–506.

Hall, H.M., Walsh, J., Greenwod, R. and Vodden, K. (2016). Advancing innovation in Newfoundland and Labrador: Insights for knowledge mobilization and university-community engagement. *Journal of Community Engagement and Scholarship*, 9(1): 19-30.

Hechavarria, D., Renko, M., & Matthews, C. (2012). The nascent entrepreneurship hub: goals, entrepreneurial self-efficacy and start-up outcomes. *Small Business Economics*, 39(3), 685-701.

Hernández-Espallardo, M., Sánchez-Pérez, M., & Segovia-López, C. (2011). Exploitation- and exploration-based innovations: The role of knowledge in inter-firm relationships with distributors. *Technovation*, 31(5-6): 203–215.

Isenberg, D. (2010). How to start an entrepreneurial revolution. *Harvard Business Review*, 88(6): 40-50.

Isenberg, D. (2011). *The Entrepreneurship Ecosystem Strategy as a New Paradigm for Cultivating Entrepreneurship: Principles for cultivating entrepreneurship*. Boston: Babson Global.

Isserman, A. (2007). State economic development policy and practice in the United States. In Plane, Mann, Button & Nijkamp (Eds.), *Regional Planning: Classics in Planning* (Vol. 4). Cheltenham: Edward Elgar Publishing.

Janssen, Frank. 2009. "Does the Environment Influence the Employment Growth of SMEs?" Journal of Small Business and Entrepreneurship 22 (3):311–26.

Janzen, O.U. (1987). Review: *Horwood, Harold. Corner Brook: A Social History of a Paper Town*. Newfoundland History Series No. 3. St. John's: Breakwater Books, 1986. Pp. 182. Illustrations. $24.95 cloth; $14.95 paper. *Urban History Review* Vol 16 (1), 138-139.

Korsgaard, S., Ferguson, R. & Gaddefors, J. (2015). The best of both worlds: How rural entrepreneurs use placial embeddedness and strategic networks to create opportunities. *Entrepreneurship and Regional Development*, 27 (9-10): 574-598.

Lam, J., Carter, K., McGillis, L., Pike, C., McCahon, M. & Vodden, K. (2013). *Networks for Business Innovation in Corner Brook, NL*, Report prepared for the Harris Centre, Memorial University of Newfoundland.

Lambiotte, R., Delvenne, J-C., Barahona, M. (2015). Laplacian dynamics and multiscale modular structures in networks. *IEEE Transactions on Network Science and Engineering*, 1(2): 76-90.

Laursen, K., & Salter, A. (2006). Open for innovation: the role of openness in explaining innovation performance among U.K. manufacturing firms. *Strategic Management Journal*, 27(2): 131-150.

Malecki, E. (2018). Entrepreneurship and entrepreneurial ecosystems. *Geography Compass*, 12(3): 1-12.

Mason, C., & Brown, R. (2014). *Entrepreneurial ecosystems and growth-oriented entrepreneurship*. The Hague: OECD.

Mason, C., & Brown, R. (2013). Creating good public policy to support high-growth firms. *Small Business Economics*, 40(2): 211-225.

Mayoux, L. (2001). Tackling the downside: Social capital, women's empowerment and micro-finance in Cameroon. *Development and Change*, 32(3): 435–464.

Motoyama, Y., & Knowlton, K. (2017). Examining the Connections within the Startup Ecosystem: A Case Study of St. Louis. *Entrepreneurship Research Journal*, 7(1). https://doi.org/10.1515/erj-2016-0011

Murphy, M., Danis, W., Mack, J., & Sayers, J. (2020). From principles to action: Community-based entrepreneurship in the Toquaht Nation. *Journal of Business Venturing*: 19 (6).

Napier, G., & Hansen, C. (2011). *Ecosystems for scaleable firms*. Copenhagen: FORA Group.

Obadic, A. (2013). Specificities of EU cluster policies. *Journal of Enterprising Communities: People and Places in the Global Economy*, 7(1): 23-35.

Qalipu First Nation. (2020). "Qalipu First Nation: Background". Available at: http://qalipu.ca/about/background/

Ries, E. (2011). *The Lean Startup: How Constant Innovation Creates Radically Successful Businesses*. London: Portfolio Penguin.

Ribeiro-Soriano, D. (2017). Small business and entrepreneurship: Their role in economic and social development. *Entrepreneurship and Regional Development*, 29 (1-2): 1-3.

Saxenian, A. (1996). Inside-out : Regional networks and industrial adaptation in Silicon Valley and Route 128. *Cityscape: A Journal of Policy Development and Research*, 2(2), 41–60.

Schumpeter, J.A. (1934). *The Theory of Economic Development*, Trans. R. OPIE. Cambridge, MA: Harvard University Press.

Schafer, S. & and Mayer, H. (2019). Entrepreneurial ecosystems: Founding figures and research frontiers in economic geography. *De Gruyter*, 63 (2-4):55-63.

Spigel, B. (2020). *Entrepreneurial Ecosystems: Theory, Practice and Futures*. Northampton, Massachusetts: Edward Elgar Publishing.

Spigel, B., Kitagawa, F., & Mason, C. (2020). A manifesto for researching entrepreneurial ecosystems. *Local Economy*, 35(5), 482–495. https://doi.org/10.1177/0269094220959052

Spigel, B., & Vinodrai, T. (2020). Meeting its Waterloo? Recycling in entrepreneurial ecosystems after anchor firm collapse. *Entrepreneurship and Regional Develop*ment, 1–22. https://doi.org/10.1080/08985626.2020.1734262

Spigel, B. (2017). The relational organization of entrepreneurial ecosystems. Entrepreneurship Theory and Practice, 41(1): 49-72.

Spigel, B., & Harrison, R. (2017). Toward a process theory of entrepreneurial ecosystems. *Strategic Entrepreneurship Journal*, 12: 151-168.

Stam, E. (2015) *Entrepreneurial Ecosystems and Regional Policy: A Sympathetic Critique*. Utrecht University: Tjalling C. Koopmans Research Institute.

Stam, E., Bosma, N., Van Witteloostuijn, A., de Jong, J., Bogaert, S., Edwards, N. & Jaspers, F. (2012). *Ambitious entrepreneurship. A review of the academic literature and new*

*directions for public policy*. Den Haag: Adviesraad voor Wetenschap en Technologie-beleid (AWT).

Stangler, D., & Bell-Masterson, J. (2015). *Measuring an Entrepreneurial Ecosystem*. Kauffman Foundation. March.

Startup Genome. (2020). *Project Genome: The Global Startup Ecosystem Report 2020 (GSER 2020).* Available at: https://startupgenome.com/report/gser2020

Stuart T.E., & Sorenson O. (2005). Social Networks and Entrepreneurship. In: Alvarez S.A., Agarwal R., Sorenson O. (eds) *Handbook of Entrepreneurship Research.* International Handbook Series on Entrepreneurship, vol 2. Springer: Boston, MA.

Tappeiner, G., Hauser, C., & Walde, J. (2008). Regional knowledge spillovers : Fact or artifact ? *Research Policy*, 37(5): 861–874.

Van de Ven, Andrew. (1993). The Development of an Infrastructure for Entrepreneurship. *Journal of Business Venturing,* 8:2 p.11–30.

Vodden, K., Tucker, A, Gibson, R. & Holley, J. (2011). *Network weaving for regional development on the tip of the Great Northern Peninsula,* Report prepared for the Rural Secretariat, Government of Newfoundland and Labrador.

Walsh, J. & Winsor, B. (2019). "Socio-cultural barriers to developing a regional entrepreneurial ecosystem." *Journal of Enterprising Communities: People and places in the global economy, 13* (3), 263-282. https://doi.org/10.1108/JEC-11-2018-0088

Wang, C. C. (2015). Geography of knowledge sourcing, search breadth and depth patterns, and innovative performance : a firm heterogeneity perspective. *Environment and Planning A: Economy and Space*, 47: 744–761.

Wang, C. H. (2011). The moderating role of power asymmetry on the relationships between alliance and innovative performance in the high-tech industry. *Technological Forecasting and Social Change*, 78(7): 1268–1279.

Welter, F., Baker, T., Audretsch, D.B. & Gartner, W. B. (2017). Everyday Entrepreneurship - A call for entrepreneurship research to embrace entrepreneurial diversity. *Entrepreneurship Theory and Practice*. 41(3): 311-321.

Winsor, B. & Carter, K. (2018). *Mapping Knowledge Seeking in the St. John's and Corner Brook Entrepreneurial Ecosystems*. St. John's, NL: Harris Centre Regional Analytics Laboratory, Memorial University. Available at: https://www.mun.ca/harriscentre/reports/WINSOR_CARTER_ARF_15-16.pdf

World Economic Forum (2013). Entrepreneurship ecosystems around the globe and company dynamics. Report summary from the annual meeting of the new champions, World Economic Forum, Stanford University, Ernst and Young, & Endevor. Davos, Switzerland.

Wu, A., & Wang, C. C. (2017). Knowledge search pattern and product innovation of firms in low and high-technology industrial clusters : A knowledge relatedness perspective. *Tijdschrift voor economische en sociale geografie*, 108(4): 488–502.

Zahra, S. & George, G. (2002). Absorptive Capacity: A Review, reconceptualization, and extension. *Academy of Management Review*, 27(2): 185–203.

## Chapter 5: Contextualizing Territorial Innovation Models - Lessons from Less Favoured Regions in Western Newfoundland

**Abstract:** Territorial innovation models tend to valorize technology startups, urban centres, and high growth firms. This Chapter reviews the literature on RIS, entrepreneurial ecosystems and the relevance of these territorial innovation ecosystems to less favoured regions. I investigate how the models can be integrated to develop a model that is 'fit for purpose' to support innovation and entrepreneurship in these less favoured regions. Key factors are identified from each of these elements across seven themes identified in the literature of RIS, ecosystems and applied to the context of less favoured regions. The Chapter then adapts these factors to a stage of development or life cycle model adapted from the ecosystem literature (Cukier et al., 2015). The Chapter contributes a novel addition of a pre-ecosystem stage that acknowledges less favoured regions are often not yet ecosystems but should not be excluded from aspirational work towards the early nascent stage. The combination of the outline of region specific factors and a life cycle approach provides a fuller analysis of innovation and entrepreneurship in less favoured regions. Additionally, the analysis and new model provide entrepreneurs, as well as policy and support actors, with factors to investigate and practical recommendations to support evolution and development within these ecosystems (or aspiring ecosystems). This Chapter builds on and integrates the findings of previous Chapters within this dissertation to develop a territorial innovation model for less favoured regions. This model contributes to the literature by showing how less favoured regions can benefit from this approach.

**Keywords:** Territorial innovation models; Less favoured regions; Regional innovation systems; Entrepreneurial ecosystems

## 1. Introduction

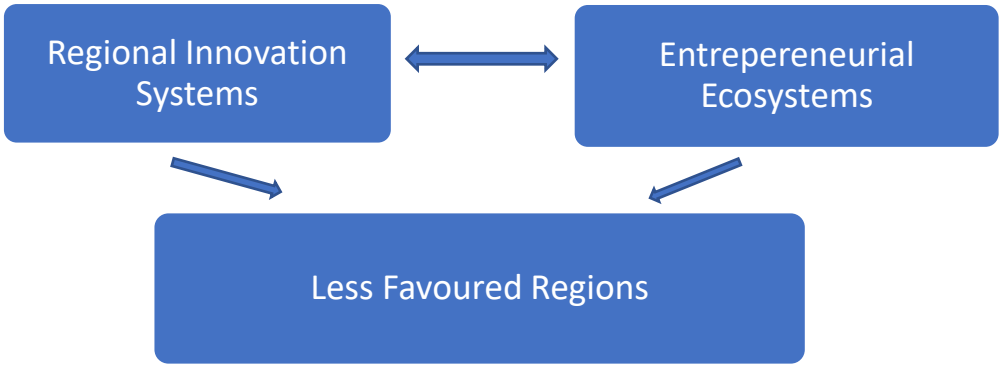
In the search for innovative approaches to the economic revitalization of communities and regions, economic geographers have focused more on highlighting the importance of system-level innovation while entrepreneurship literature speaks more to supporting individual entrepreneurs (Bell & Janye, 2009; Horlings &Marsden, 2013; Grabher, 2018). At the systems level, territorial innovation models (TIMs) suggest that sub-national regions represent an appropriate scale for the development of policy and practice related to economic development (Moulaert & Mehmood, 2010; Cooke & Morgan, 1998), arguing that economic growth is driven by regional competitiveness and innovation (Markey, Halseth & Manson, 2006). One such TIM - regional innovation systems (RIS) - advocates for greater innovation and growth through stronger connections between regional science and technological capacity, on the one hand, and the region's industrial capacity on the other (Doloreux & Parto, 2005; Eder, 2019).

In contrast, the entrepreneurial ecosystem model focuses on individual entrepreneurs and their agency (Stam, 2017), offering a fuller explanation of their contributions to economic growth (Audretsch, 2015), and building on calls for inclusive innovation that expand notions of who can participate in innovation activities and where they can occur (Bramwell, 2021). Increasingly, the ecosystems model is being linked to TIMs, particularly RIS and the quadruple helix of increased interactions between government, universities, community, and firms (Spigel, 2017; Stam, 2015). Recently a range of disciplines have incorporated economic geography-based system-level concepts to build an approach to regional level evolution that builds upon the individual agency of entrepreneurs. This ecosystems approach also allows for economic geography to investigate how the agency of actors is both constrained and amplified by institutional structures, including how entrepreneurial actors can act through institutions such as

universities or government agencies (Lowe and Feldman, 2017). These explorations offer new ways to integrate systems-level thinking with individual and community-led entrepreneurship.

However, research and practice have long overlooked rural and peripheral areas as sites of innovation for regional development and entrepreneurship. TIMs, including both RIS and entrepreneurial ecosystems, have mostly emerged from the analysis of successful urban ecosystems and clusters (e.g., Saxian's 1994 review of Silicon Valley). This success literature has raised concerns about the applicability of TIMs to rural and peripheral places (Wolfe & Gertler, 2004). These latter regions are characterized by a lack of economies of scale due to low population density and distance between communities and markets (Todtling & Trippl, 2005). The application of TIMs to what are often called 'less favoured regions' continues to be problematic, requiring nuance, differentiation, and sensitivity in applying urban-centric models to rural contexts. Policy and practice related to TIMs must therefore be applied with the key needs and differences of regions in mind. Figure 4 outlines how the Chapter combines RIS and ecosystems to contribute to an understanding of the dynamics of less favoured regions.

**Figure 4: RIS and ecosystems applied to less favoured regions**



This Chapter seeks to address this gap by answering three research questions. First, what are the key factors for enhancing innovation and entrepreneurship according to the literature on rural entrepreneurship (i.e., RIS as expounded in Chapter 3 and entrepreneurial ecosystems in Chapter 4)? Second, what context specific factors would an innovation and entrepreneurship model for less favoured regions include? And third, what relevance does such a model have for the policy and practice of evolving ecosystems in these regions?

To answer these questions, I conduct a systematic review of regional innovation literature, integrate insights from two distinct frameworks - regional innovation systems (RIS) and entrepreneurial ecosystems – and propose a life cycle model for supporting innovation and entrepreneurship in less favoured rural regions. I also introduce the illustrative example of western Newfoundland, Canada, a less favoured and predominantly rural region in which the authors have worked extensively as both researchers and practitioners in local economic development and regional engagement. Drawing on our first-hand knowledge of the region, and recent empirical studies in two sub-regions of western Newfoundland (including my own research), I offer exploratory findings on the applicability of the proposed model in this region. Based on these initial findings, I offer recommendations for how the proposed model could be applied more widely in less favoured rural regions.

This Chapter offers several key contributions to understanding the use of regional innovation models in less favoured rural regions. First, I highlight how the entrepreneurial ecosystem model has significant promise as the basis of economic development for rural regions due to greater focus on entrepreneurs as central actors in economic development (Audretsch, 2015) as well as the importance of a wider network of entrepreneurship enablers (Thompson, 2010). Second, I critique the over-emphasis on high growth firms in the entrepreneurial

ecosystem literature (Mason and Brown, 2013), which is of limited relevance to rural regions since there are few of them and they are unlikely to be the basis of rural economies. Third, building on recent work in entrepreneurship literature (Welter et al., 2017), the findings highlight the need for a more inclusive view of entrepreneurship in rural regions where social and community-based enterprise play important roles (Steiner et al., 2019). Fourth, following Spigel (2017), I argue that the entrepreneurial ecosystem model is best understood as a TIM, which can be bolstered theoretically through previous academic debates on regional innovation systems, the quadruple helix, and literature on less favoured regions. Finally, the model proposes that rural ecosystems are likely to be characterized by a pre-ecosystem or pre-nascent stage, which requires greater nurturing and support from governments, support organizations, and universities than in an urban context where Feld (2012) and Isenberg (2010) argue, they should be primarily entrepreneur-led.

The Chapter continues by reviewing the relevant literature on natural resource-based, rural, and peripheral regions. Next, it summarizes the literature on RIS and entrepreneurial ecosystems, as well as frameworks for strengthening regions through these models. The Chapter then presents the proposed model of regional innovation emerging from the literature review. Finally, I engage the proposed model with two case studies presented in Chapters 3 and 4, showing that the model aligns well with them.

## 2. Literature Review

### *2.1 Uneven Development in Less Favoured Rural Regions*

This section discusses the context of less favoured regions, explores unique considerations for entrepreneurship and regional development in these contexts, and exposes the knowledge gaps

left by existing theoretical frameworks on regional innovation systems and entrepreneurial ecosystems.

The literature on innovation systems connects the concept of less favoured regions with ideas of periphery (Antonopoulos et al., 2009), peripheralization (Kühn, 2015), poverty or less affluence (Jones, 2010), and slower economic development (Morgan & Nauwelaers, 2002). Focusing particularly on the sub-national regional scale, which Paasi (2010) describes as "a product of a particular combination and articulation of social relations stretched over space" (p. 2,298), regions can be seen as the sites of geospatial disparities in economic growth and investment (Pike et al., 2007). Regions passed over by these 'uneven development' processes are seen as failing to perform relative to expectations related to innovation, trade, technology adoption, and regional competitiveness (Castillo et al., 2002). While an in-depth exploration of these concepts is beyond the scope of this Chapter, it should be noted that they articulate issues of disparity in social relations which have strong implications for political and economic processes (Kühn, 2015). As articulated by Kühn (2015), the process of peripheralization occurs when a region or sector becomes marginalized from the core or center of economic development and their relationship is one marked by inequality. While this process can indeed occur within cities, the literature often asserts that unequal development and peripheralization are "particularly obvious in rural areas" (Antonopoulos, et al., 2009, p. 516) as compared to metropolitan centres (Halfacree, 2007). This precipitates a divide between so-called leading and lagging regions as investment and economic activity are concentrated in a small geographic area (Pike et al., 2007).

Global trends since the 1980s have exerted pressure on local economies to move away from resource extractive industries toward models that are diversified and knowledge-based (see Chapter 2). This shift has been particularly difficult to implement in rural and natural resource-

based areas due to historical dependence on a small number of major employers and ongoing challenges with access to high-speed internet in many rural areas (Salemink et al., 2017). Economic transitions away from primary industries together with automation have left many rural regions without their traditional economic base (Breen et al., 2019), forcing local actors to explore innovative approaches to regional economic development. This uneven transition can often be traced to historical socio-economic patterns which may precipitate "self-reinforcing processes" (Sydow, Jörg, Windeler, et al., 2012, p. 157) of development and underdevelopment. The concepts of path-dependence and path creation acknowledge the complexity of these systems and suggest that even though past decisions can continue to affect economic development (Beeton & Galvin, 2017), flexibility in response to change can facilitate new trajectories or path-creation. This growing research area seeks to understand how less favoured regions can break away from path-dependent outcomes to find new regional growth paths (Grillitsch & Sotarauta, 2020).

Mainstream theory and practice on entrepreneurship and innovation often overlooks less favoured rural regions and the unique assets and challenges facing entrepreneurs and other regional economic development actors (see Chapter 3, Welter et al., 2017). Considering that rurality is a fluid concept with inherent ambiguities based in self-perceived identities and practices on the one hand, and formal representations based on statistical benchmarks on the other (Halfacree, 2007; Woods, 2009), rural regions vary greatly across national contexts. Nonetheless, prevailing models of sustainable development tend to overlook rural contexts, measuring success with narrow quantitative indicators designed for urban settings while undervaluing social capital and other community assets that are often strong in rural regions (Lowery et al., 2020). While some authors suggest that advancing innovation following

quadruple helix interactions and territorial innovation models can address some of the regional shortcomings that hinder local development (Natario et al., 2017; Kolehmainen et al., 2016), there is a need to explore models that consider the unique assets and challenges inherent in rural regions, which are often quite different from those of urban contexts (Markey, Connelly, & Roseland, 2010).

It is important to note that rural regions differ greatly in their economic fortunes across national and international scales. For example, in Canada there are great extremes between thriving rural innovation systems such as La Pocatière, Québec (Doloreux et al., 2007), and remote regions like the Great Northern Peninsula of Newfoundland and Labrador (Chapter 3), while secondary Northern city-regions like Sudbury, Ontario can feature robust regional innovation systems (Hall, 2017). Furthermore, resource-based regions often retain considerable human capital assets in industry-specific skills, such as in forestry-based regions of Norway, that may be applicable to new labour market opportunities (Holmen and Fosse, 2017). While some authors suggest that advancing innovation following quadruple helix interactions and territorial innovation models can address some of the regional shortcomings that hinder local development (Natario et al., 2017; Kolehmainen et al., 2016), there is a need to explore models that consider the unique assets and challenges inherent in rural regions, which are often quite different from those of urban contexts (Markey et al., 2010).

### *2.2 Fostering Innovation and Entrepreneurship in Less Favoured Regions*

In less favoured regions a key question is how local actors can break away from path-dependent outcomes, both by accessing novel market opportunities in locally established platform sectors and technologies as well as by branching within these platforms to new development

opportunities (Asheim, Boschma & Cooke, 2013). While existing approaches to traditional sector development are important, innovation based on relatedness to local strengths and sectors can allow new development paths from existing industries (Cooke, 2012). Examples can include development of new high-value products from waste streams of fisheries, agriculture, or forestry sectors (e.g., Hurmekoski, Jonsson, Korhonen, Janis, Makinen, Leskinen, & Hetemaki, 2018). Much literature on regional economic development and innovation has stressed the importance of this new path development, building on research in evolutionary economic geography to draw attention to patterns of path dependence and its role in rural economic transformation (Cooke, 2012; Tonts et al., 2014). Therein, researchers have emphasized the central role of actors such as entrepreneurs, public policy support agencies, and post-secondary educational institutions in identifying new regional growth paths (Holmen & Fosse, 2017). This approach is consistent with prevailing research and policy frameworks on regional innovation systems or Smart Specialization, common in the European Union (European Union, 2019).

Further, regional development literature has highlighted the importance of place as a source of unique assets and capabilities for less favoured regions (Grillitsch & Sotarauta, 2020), including how regions can engage in place-based branding to develop a sense of *terroir* for product specialization and the attraction of residents and investment (Mommaas & Jannsen, 2008; Oliveira, 2016). Similarly, local innovation processes can draw on a range of community capital assets to enhance regional sustainability (Adhikari et al., 2018), thereby contributing to the 'spiraling up' of regional well-being (Emery & Flora, 2006; Fernando & Goreham, 2018). However, in Chapter 3 we saw how rural and natural resource-based regions such as the Northern Peninsula are often excluded from prevailing regional innovation models, reinforcing prevalent urban-centric narratives in Western culture and society that cast the city as the centre

of creativity and innovation and the countryside as static and antiquated (Hall & Donald, 2009; Bell & Jayne, 2010).

A central component of finding new paths in less favoured regions is focusing on entrepreneurs as drivers of societal innovation and novel opportunity exploration. Despite origins in very individually focused research with little attention to context, entrepreneurship researchers have increasingly acknowledged the role of community contextual factors in shaping the motivations and actions of entrepreneurs (Welter, 2011). The entrepreneurship literature has engaged with systems level thinking evidenced by the move away from 'internal' personality-based factors (Janssen, 2009), to more context driven factors (Van de Ven, 1993).

However, critiques have highlighted that entrepreneurship research has neglected geographic contexts outside of a few celebrated successful locales (e.g., Saxian's 1994 study of Silicon Valley, or Issenberg's 2010 focus on large city ecosystems) (Steyaert & Katz, 2004). There is also a tendency to favour high-growth firms in high tech fields over more "everyday" forms such as subsistence entrepreneurs or family businesses (Welter et al., 2017).

In response to these critiques, there has been rapid increase in interest in social and community-based entrepreneurship (Ratten & Welpe, 2011), including how these entrepreneurs seek to contribute to community development in less favoured regions (Johnstone & Lionais, 2004; Korsgaard et al., 2015). A small but growing research stream on rural social enterprise has explored questions such as whether social entrepreneurs can fill gaps in public services left by state withdrawal from rural areas (Steinerowski & Steinerowska-Streb, 2012), and how place-specific identities and assets influence the creation and activities of rural social enterprises (Steiner et al., 2019). This research area acknowledges the importance of context-specific assets such as social capital and trust (Marti et al., 2013), intangible cultural assets such as heritage and

identity (Korsgaard et al., 2015), and community gathering spaces that can act as hubs of connectivity and innovation (Bosworth et al., 2020). In rural contexts, the importance of secondary actors to enable entrepreneurs has frequently been highlighted (Steiner & Teasdale, 2019; Thompson, 2010), calling for a robust network of actors who provide formal and informal supports to entrepreneurship.

### *2.3 Integrating Territorial Innovation Models*

#### *2.3.1 Regional Innovation Systems*

The RIS model highlights the importance of the quadruple helix of government, industry, university, and community partnerships and focuses on increasing interactions among these players (Foray, 2012). RIS also valorizes partnerships between the science capacity of a region and the industrial/entrepreneurial capacity, suggesting that these lead to innovation and increase regional competitiveness (Doloreux & Parto, 2005). These various interactions create 'local buzz' or increased communication through networks of business, community, universities, and governments, which can lead to innovation through new products, processes, and market development (Storper & Venables, 2002). However, external connections or global pipelines are also critical to bringing innovation to local players (Bathelt, Malmberg & Maskell, 2004). This system-based approach prioritizes local and external interactions among key economic actors to drive innovation at the local level through co-working and co-learning (Morgan, 2007).

A key strength of the RIS model is the planning component, as articulated through the smart specialization strategy of the European Union (Interreg Europe, 2019). This inclusive entrepreneurial discovery process (EDP) builds on a region's existing strengths in science and technology (Interreg, 2019; Nieth et al., 2018), tying the process to an evolutionary economic

geography approach through path dependency and local assets. RIS recognizes that less favoured regions need to build on local assets, not just develop high-tech sectors as often seen in urban ecosystem development (Foray et al., 2012). Rural areas often have strengths in natural resource extraction, agriculture, tourism, cultural industries, and other sectors, providing opportunities to support new path development in these sectors (Grillitsch & Sotarauta, 2020). In this way, place-based development approaches can build on a region's intangible assets, like identity and cultural heritage, to maximize employment and wealth (Roberts and Townsend, 2016).

RIS focuses on the importance of key business and entrepreneurship support organizations, which play an enabling role in the system (Interreg Europe, 2019). Supporting industry and entrepreneurs through skill development, financing and mentor support, and cultural acceptance of entrepreneurship is critical to the ability of business to play a more robust role within the quadruple helix (Foray, 2012). Table 9 below summarizes key factors for the RIS approach.

Two brief examples of success in path development and building on assets and strengths are Ellingsoy, Norway and La Pocatiere, Quebec. Ellingsoy is a remote island in Norway and is home to a Bacalao (or salt fish) cluster of firms. Salt fish production employs 300 people of the towns 1700 residents. The product is primarily exported to Portugal and Brazil. The firms have multigenerational connections to these markets and maintain close marketing relationships ensuring the Ellingsoy product and relationships are superior to competitors (Floysand & Jacobsen, 2010). Ellingsoy has built on the historic attachment to the fishery to ensure ongoing strengths on the export of salt fish. Efforts to train new generations are undertaken across production and marketing that has kept Ellingsoys product in high demand (Floysand & Jacobsen, 2010). La Pocataire, QC is another small town of 6,500 people on the south bank of

the St. Lawrence river, about an hour from Quebec City. Doloreux, Dionne & Jean (2007) outline the history of the rural innovation system. The region has a strong educational tradition from the Jesuit influence within the predominant Catholic population. This tradition evolved to several educational institutions in the region around agriculture and more recently manufacturing related research and training (Doloreux, Dionne &Jean, 2007). The region continues to have agricultural research capacity supporting the regional farms. In 1962 Bombardier set up manufacturing of snow mobiles and later shifted to manufacturing trains for the growing North American subway systems (Doloreux, Dionne & Jean, 2007). The educational system adjusted, and new research facilities emerged in photonics and welding to support the industrial turn in the region. Both these brief examples highlight rural regions building on local strengths to remain competitive and support economic development.

**Table 9: Key Factors from RIS/S3**

| Factors | | Description | Relevance |
|---|---|---|---|
| **Governance** | ***Planning*** | Inclusive planning process across quadruple helix partners | Bottom-up approach to regional development and governance |
| | ***Entrepreneurial process of discovery*** | Finding key entrepreneurial opportunities that connect science capacity to industrial capacity | Connecting new opportunities to local capacities and strengths |
| | ***Quadruple helix (QH)*** | Strengthening interactions of key actors in the innovation system | Leads to technological and policy innovation |
| **Connections** | ***Local buzz through QH, global pipelines*** | Local networking and global connections | Local interactions and connecting to global technology and markets |
| | ***University – industry connections*** | Connecting regional science capacity to industry development | Strengthens regional competitiveness |

*2.3.2 Entrepreneurial Ecosystems*

The entrepreneurial ecosystems model has emerged more recently, offering an approach to territorial innovation that seems widely applicable to many contexts (Schafer and Mayer, 2019). Its key insight is the focus on entrepreneurship and how a linked network of actors can provide

supports to entrepreneurs, which has been shown to positively impact regional economic development (Audretsch, 2015; Ribeiro-Soriano, 2017). The entrepreneurial ecosystems model has grown in popularity as regions look to learn from successful ecosystems (Acs, Stam, Audretsch, & O'Connor, 2017; Malecki, 2018). Based on the ecosystems literature, Chapter 4 defined entrepreneurial ecosystems as unique, complex, self-sustaining environments that support entrepreneurial activity (drawing from Malecki, 2018; Spigel, 2017; Feld, 2012).

The ecosystems approach is distinct from RIS in several ways. First, ecosystem models are more agency focused viewing entrepreneurs as the central actors in the system (Feld, 2012; Isenberg, 2010). Second, ecosystem models have stressed the importance of life-cycles to understand how ecosystems evolve and develop (Cukier et al., 2015; Project Genome, 2020). Cukier et al. (2015) outline nascent, evolving, maturing, and self-sustaining phases, while Startup Genome (2020) phases include activation, globalization, attraction, and integration phases. These various ecosystem development approaches outline how regions can evolve from early-stage adoption of entrepreneurship, to budding entrepreneurial hubs of activity, and on to sophisticated ecosystems with deep entrepreneurial cultures, as evidenced by deal flow and successful entrepreneurial exits (Cukier et al. 2015). These models are mostly tech oriented and urban specific though I am applying them to less favoured regions and discussed this in the previous Chapter. Third, ecosystem proponents are less planning or sectoral development oriented, preferring to focus on entrepreneurial agency as expressed through self-identified ventures. This thinking leads to an agnosticism towards path-dependency or regional assets, in favour of entrepreneurial led development (Issenberg, 2010). Fourth, the ecosystem approach tends to valorize high growth start-ups, or 'gazelles', within technology-based industries (Mason & Brown, 2014; Ahmad & Hoffman, 2008).

The entrepreneurial ecosystems approach has been articulated through several models outlining success factors. Table 10 summarizes four models including Isenberg (2011), Foster et al. (2013), Cukier et al. (2015), and Koltai (2016). Each of these models identifies key factors for ecosystem development that can be grouped across seven themes: financing, governance, connections, metrics, activities, and values as outlined in Table 10.

**Table 10: Key Factors in Entrepreneurial Ecosystem Models**

| Factors | Cukier et al. (2015) | Isenberg (2011) | Koltai (2016) | Foster et al. (2013) |
|---|---|---|---|---|
| **Financing** | • Exit strategies<br>• Angel funding | • Financial capital<br>• Infrastructure | • Fund | • Funds and finance |
| **Governance** | • Ecosystems generations | • Leadership<br>• Government<br>• Support services<br>• Entrepreneurship organizations | • Enable public policy | • Government and regulatory framework<br>• Human capital |
| **Connections** | • Entrepreneur-ship in universities | • Networks<br>• Economic clusters<br>• Early customers<br>• Human capital | • Connect and sustain | • University catalyst<br>• Accessible market<br>• Support system/mentors |
| **Metrics** | • Ecosystem data and research | | • Identify | |
| **Activities** | • Events | • Education | • Train | • Education and training |
| **Communications** | • Specialized media | • Success stories | • Celebrate | |
| **Values** | • Cultural values | • Culture | | • Cultural support |

Note: some of the values in the table are empty due to particular models not including these factors

As shown in Table 10, financing includes access to various forms of capital (venture, angel etc.) and is a critical component to new startups (Issenberg, 2011). Governance includes 1) entrepreneurial leadership of the ecosystem, 2) impacting public policy to support the ecosystem, and 3) engaging with the regulatory framework and pushing for changes as necessary (Issenberg, 2011; Foster et al., 2016). Connections in an entrepreneurial ecosystem context include strengthening ties to universities, which act as sites for research and development of human

capital to enhance the ecosystem through new entrepreneurs (Feld, 2012). Universities spin out new startups, as well as provide new knowledge through technology transfer offices (Foster et al., 2016). Second, entrepreneurs forge connections to each other through networking opportunities, including mentoring services that mature entrepreneurs provide for startups (Isenberg, 2011). Third, connections to existing clusters of business activity can lead to local advantage to build new startups. Fourth, entrepreneurs connect to markets through early customers available in the ecosystem and leverage broader markets based on local success (Issenberg, 2011). Metrics track the evolution of the ecosystem over time as it moves through stages of development. For example, in Atlantic Canada Entrevestor counts the number of new startups each year, as well as employment numbers, new funding, exits, and other metrics (Entrevestor, 2021). Activities are a key factor for generating buzz in an ecosystem, fueled by events such as startup weekends, hack-a-thons, venture capital pitching sessions, training sessions, and other activities (Feld, 2012). Communications and media are an important factor in celebrating the success of the entrepreneurs in ecosystem (Cukier et al., 2015). Finally, building a culture of entrepreneurship is important to the overall robustness of the ecosystem, which attracts more entrepreneurs and mentors and helps sustain the ecosystem (Foster et al., 2016).

### *2.4 Knowledge Gap in Applying TIMs to Less Favoured Regions*

Despite the wide application of both RIS and entrepreneurial ecosystem models, and the broad factors identified above, neither of these frameworks has been adequately explored in the context of less favoured rural regions. Although scholarship in both areas has advanced ongoing debates around the need for more place-based approaches to rural economic development (Horlings and Marsden, 2014), with an increasing focus on entrepreneurship and entrepreneurial ecosystems,

these debates continue to play out primarily in metropolitan regions and continue to exclude small cities and rural regions (Bell and Jayne, 2009; Eder, 2018). Furthermore, as highlighted in both entrepreneurship and innovation literature , these research areas tend to be fixated on a small number of celebrated locations in Western Europe and North America (Graffenberger and Vonnahme, 2019; Welter et al., 2017). The present article seeks to address this gap by integrating and adapting the RIS and ecosystem frameworks with an explicit focus on less favoured regions.

### *2.5 Contextual Factors Affecting Innovation in Less Favoured Regions*

Considering the key factors of RIS and entrepreneurial ecosystems and knowledge gap identified above, there are a number of context-specific factors that are important to consider when approaching innovation in less favoured rural regions. First, an evolutionary economic geography lens has drawn attention to patterns of path dependence and the role of new path development in rural economic transformation (Cooke, 2012; Tonts et al., 2014), while highlighting contextual factors such as the region's history, expertise, and assets as key factors in breaking away from path-dependent outcomes and finding novel development strategies (Grillitsch and Sotarauta, 2020). These assets may include natural resource extraction-based capacities, strong social capital, or intangible cultural assets (Emery and Flora, 2006), yet they tend to be overlooked as strengths and opportunities for entrepreneurial innovation. Second, rural contexts require a broader view of entrepreneurship that includes social and community-based entrepreneurship (Steiner and Teasdale, 2019), as well as the acknowledgment of entrepreneurial endeavours among marginalized groups, such as women's entrepreneurship and Indigenous enterprise (Murphy et al., 2020; Welter et al., 2017). In urban contexts, high-growth firms are the

main focus of ecosystems, while in less favoured regions it is essential to acknowledge the importance of these entrepreneurial actors who are often excluded from mainstream conceptions of economic development (Arias Schreiber et al., 2020).

Third, community gathering spaces can support networking by encouraging robust interactions among actors in regions that lack university campuses and other institutional infrastructure (Bosworth et al., 2020), for example digital hubs that can improve access to high-speed internet and enhance networking opportunities (Perez et al., in press). Fourth, while the role of support organizations as leaders is noted in RIS (but often absent in ecosystems models), in rural contexts with a weak and dispersed entrepreneurial class there are important roles for governments, universities, and community in building and leading ecosystem development (Carter and Vodden, 2017). This highlights the importance of 'entrepreneurship enablers' who often work behind the scenes to support entrepreneurs (Thompson, 2010), and underlines the collective nature of many entrepreneurial processes (Meyer, 2020). These additional insights on less favoured regions are articulated in Table 11, which identifies the specific contextual factors that must be considered in an adapted territorial innovation model in rural regions.

**Table 11: Additional Factors for Applying TIMs to Less Favoured Regions**

| | **Factors** | **Description** | **Relevance** |
|---|---|---|---|
| **Asset-based approach** | Identify local strengths and assets | Local assets that can lead to entrepreneurial opportunities (new Path development) | Building on local strengths/assets and key sectors |
| | Broadening the view of entrepreneurship | Importance of recognizing importance of social and community entrepreneurship in less favoured regions | Acknowledging the full range of innovative and entrepreneurial actions |
| **Activities/space** | Co-working/ learning spaces | Community spaces that encourage learning and support for entrepreneurs | Network development and facilitating external connections |
| **Connections** | Role of regional development supports for planning | Collective entrepreneurial discovery process | Encouraging bottom-up approach to regional development |

## 3. Proposed Framework for Applying TIMS in Less Favoured Regions

Considering the identified gap in the applicability of RIS and ecosystem models to less favoured regions, this Chapter integrates key insights from these frameworks by proposing a model specifically oriented towards less favoured regions. This place-based approach to entrepreneurship acknowledges the key factors from RIS models (Table 9), essential elements of the entrepreneurial ecosystem model (Table 10), and factors specific to less favoured regions (Table 11). In addition to these factors identified in the literature review, the Chapter identifies key stages of development articulated in several ecosystem models (e.g., Cukier et al., 2015; Project Genome, 2019), combining these factors and stages into a dynamic model of innovation and entrepreneurship for less favoured regions.

The proposed model intends to advance an adapted TIM that is tailored to rural conditions, as opposed to the urban-centric and high-tech focused models prevalent in existing literature. As discussed above, rural regions differ in important ways from urban contexts, leading to key factors that must be considered in a rural innovation/entrepreneurship model. In summary, these included broadening definitions of entrepreneurship to include community and social entrepreneurship, incorporating planning based on the region's assets, addressing path dependency, building on rural social capital and strengths, considering intangible cultural assets, and supporting technology-based gathering places to support local buzz and global pipelines. In the model presented below, these factors are discussed in each of several key stages of development of rural entrepreneurial ecosystems.

The model also draws from the RIS/S3 model. Key components include the quadruple helix of private sector firms/entrepreneurs, key government agencies, universities and colleges, and community partners/entrepreneurship enablers. Connecting these key players leads to local

buzz that strengthens the ecosystem. These local linkages should also be supplemented by global pipelines that strengthen the region's external ties to bring new ideas and market connections. RIS is focused on linking the industrial/ entrepreneurial capacity to science and technology capacity, whether the latter is local or distant. The RIS/S3 planning process is key to an entrepreneurial process of discovery to implement new projects and opportunities in the region. Chapter 3 of this thesis reviewed the application of RIS to the Great Northern Peninsula of Newfoundland and found fewer entrepreneurs and weaker governance structures, though good connections among support organizations in the region.

The key insight of the entrepreneurial ecosystems approach is that entrepreneurs are crucial to regional growth and employment and must be at the centre of regional development. This entrepreneur-centric approach contrasts the RIS/S3 model, where the key goal is greater interactions across the quadruple helix with a focus on a bottom-up governance structure. The ecosystem model suggests that a region must build a culture of entrepreneurship, with many local activities supporting startups, and that entrepreneurs themselves must drive this process. While there must be support from entrepreneurship enablers, governments, venture capital/angel investors, and others, the focus always remains on the entrepreneurs themselves. Entrepreneurial ecosystem models are based on key elements that measure the strength of a given ecosystem, as outlined in Table 10. Additionally, researchers have presented life cycles of ecosystems and suggested criteria for assessing an ecosystem's current stage of development. Chapter 4 adapted the Cukier et al. (2015) life-cycle - with its four stages of nascent, evolving, mature, and self-sustaining ecosystems - to a rural context. As an ecosystem progresses from one stage to the next, it strengthens regional development and spins out more entrepreneurs and growth.

The model is grounded in the entrepreneurial ecosystems approach yet recognizes that RIS models have stronger theoretical foundations and a more extensive application in rural regions through the S3 approach in Europe (Foray et al., 2012). In this way, the model integrates the key insights from both approaches. Also, while urban centric life-cycle models tend to assume aggregation in terms of critical mass of entrepreneurs and support actors before an ecosystem can be recognized (e.g., Project Genome), in a rural context this is not possible due to fewer actors, poor access to universities and fewer support organizations. Therefore, to increase applicability for less favoured regions such a model must include a pre-ecosystem category that considers the embryonic nature of many ecosystem elements in these contexts. The model thereby acknowledges that less favoured regions are often in the pre-ecosystem stage, articulates the unique factors that characterize ecosystems at this stage (see Chapter 3 for rural success factors), and highlights the need for ecosystems to incrementally grow to the nascent stage through targeted and place-based interventions to address these factors. To be clear, these pre-ecosystems are not ecosystems, but aspire to plan and build to the nascent stage. Table 12 presents the proposed model for articulating TIMs in less favoured regions, proposing the pre-ecosystem stage as a unique feature in these contexts.

**Table 12: Factors and Stages for TIMs for Less Favoured Regions**

| Factors/criteria \ Stages | | Pre-ecosystem | Nascent | Evolving | Mature |
|---|---|---|---|---|---|
| **Financing/ markets** | ***Finance/ Angel funders*** | Limited or no financing activity | Finance pitches with angels | Organizing regular connections between entrepreneurs and capital | Regular deal flow/ Venture capital seeking startups |
| | ***Infrastructure*** | Weak | Identifying needs | Infrastructure planning | Impacting infrastructure |
| **Governance** | ***Leadership committee*** | None | Some meetings of key players | Formed with regular meetings | Leaders emerging and planning cycles |
| | ***Entrepreneurial supports*** | None | One or two orgs | Orgs impacting entrepreneurship | Key support services |
| | ***Impacting policy*** | Weak ability to impact policy | Policy documents developed | Policy impact | Policy change success |
| **Connecting** | ***Networks local buzz*** | No connections among entrepreneurs | Growing connections among entrepreneurs | Strong connections | Multiple networks of entrepreneurs with outcomes |
| | ***Social/ community entrepreneurship*** | Few | Emerging social entrepreneurship | Successful social entrepreneurs | Social entrepreneurs impacting economy |
| | ***University connections*** | Few connections | Initial relationships forming with entrepreneurs | Establishment of local Hub to house activity | Elevated activity with researchers impacting startups |
| | ***Markets global pipelines*** | Weak access | Connecting to markets | Growing success in external markets | Export orientation |
| **Metrics** | ***Data/ metrics*** | Only publicly available data | Effort to map the entrepreneurs | Economic indicators of the region | Data of emerging opportunities |
| **Activities/ space** | ***Events*** | Few | Monthly to bi-weekly events | Weekly events and start-up weekends | Buzz of activity led by entrepreneurs |
| | ***Training human capital*** | Few | More training events | Regular training programs | Training space |
| | ***Co-working Spaces*** | None | Identified space for co-working | Regular meetings in local space | Local buzz in space with supports |
| **Communications** | ***Success stories/media*** | Few stories | Monthly success stories | Weekly stories with more buzz | Own media focused on ecosystem |
| | ***Strengths/ assets*** | Lack of understanding | Key assets and challenges | Strategy for New directions from strengths/assets | Emerging new paths leading to start-ups |
| **Values** | ***Cultural values*** | Weak culture | Emerging culture | Buzz among entrepreneurs | Culture attracting new entrants |
| | ***Mentorship*** | Few | Organized group | Connecting to start-ups | Mature firms impacting start-ups |

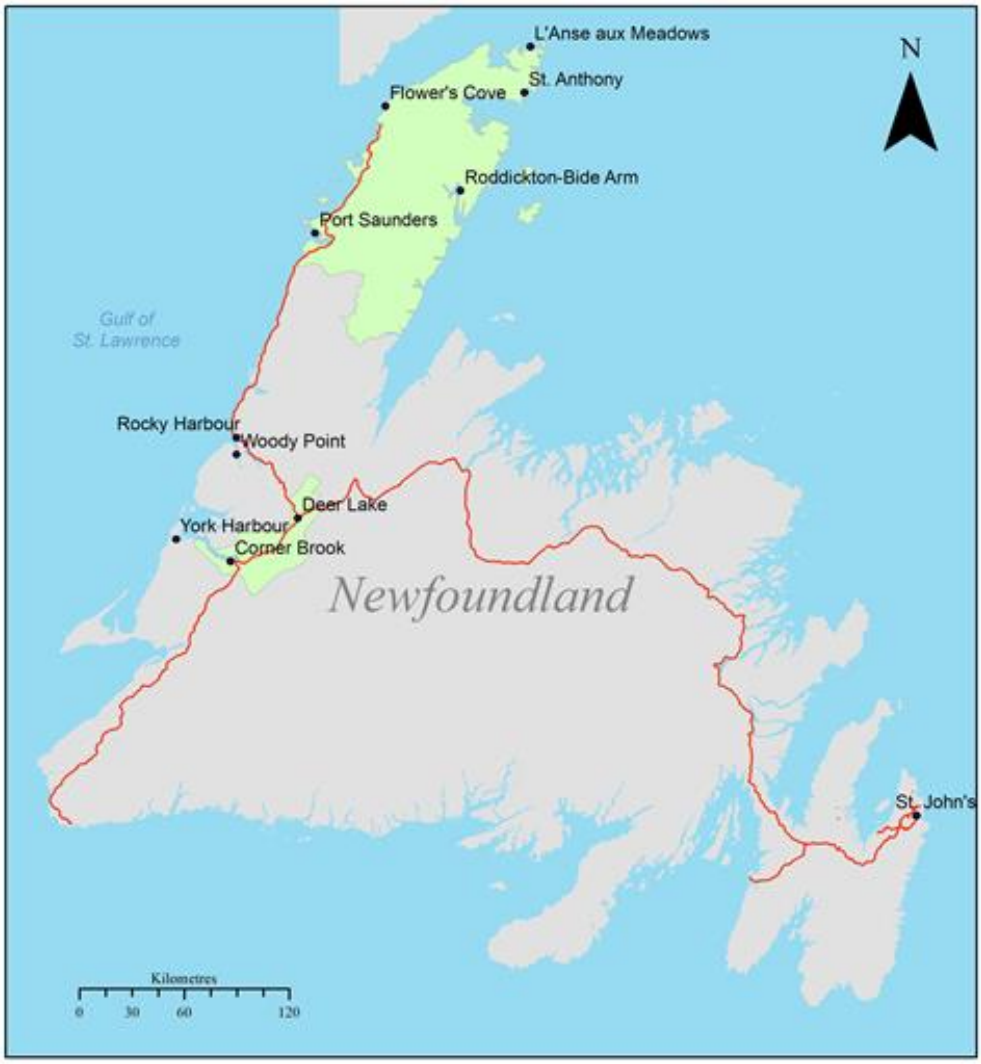
In addition to proposing a new theoretical category to the life-cycles literature, Table 12 offers a practical roadmap for less favoured regions to move towards a mature entrepreneurial ecosystem across the seven identified groups of factors. The goal of the model is twofold: 1) to offer an analytical approach to describing and understanding the current state of an ecosystem; 2) to offer a programmatic approach to move ecosystems along an evolutionary path to regional development. The model can help address a gap in the literature in terms of implementing innovation and entrepreneurship in less favoured regions.

## 4. Case Studies Applying TIMs in Less Favoured Regions

Considering this proposed model for rural and less favoured regions, which emerged from a review of literature on RIS, entrepreneurial ecosystems, entrepreneurship and innovation in rural regions, this Chapter now engages with empirical findings from Chapters 3 and 4 of this dissertation to offer a preliminary assessment of its applicability to less favoured regions. The western region of the island of Newfoundland is a largely rural and peripheral region, with the small city of Corner Brook (population 19,806) serving as an administrative and service centre for a larger catchment area of 1,140 square kilometers, population 86,650 (Community Accounts, 2021). This region includes urban, suburban, rural, and remote Northern areas, the most remote of which is the Great Northern Peninsula (see Chapter 3). The entire region is resource dependent, with declining and aging populations (excepting some areas in the Humber Valley near Corner Brook) that have been subject to significant youth outmigration (Simms and Ward, 2016). Despite these challenges, local actors from industry, educational institutions, and government have launched numerous efforts over the last 10 years to spur regional innovation and support entrepreneurship (as discussed in previous Chapters). Chapters 3 and 4 sought to

understand the assets and challenges facing regional innovation in two sub-regions of western Newfoundland applying TIMs from the innovation and entrepreneurship literature.

**Figure 5: Map of Case Study Regions**[5]




The two case studies presented in Chapters 3 and 4 reflect the issues facing a remote rural region and a small peripheral city which collectively have been resource dependent (primarily fisheries and forestry), reflecting prevalent issues facing less favoured regions. The model that

5 Map provided by Myron King, Environmental Policy Institute, Grenfell Campus, Memorial University.

this proposes can show how insights from RIS/S3, entrepreneurial ecosystems, and literature on rural entrepreneurship and innovation present ways for policy and practice to tackle innovation and entrepreneurship issues facing these regions and other similar jurisdictions. This section compares the most urban area in the region (Corner Brook), which still reflects the experience of a small peripheral city which has historically been resource-dependent (primarily fisheries and forestry), with one of the most remote regions on the island portion of NL where most communities are 300 km or more from an urban centre and natural resource sectors are still prevalent. In this context, the following section offers preliminary insights on how the life cycle model proposed above can help illuminate innovation and entrepreneurship issues facing this region and similar jurisdictions.

### *4.1 Great Northern Peninsula Sub-region*

The tip of the Great Northern Peninsula (GNP) is a sparsely populated remote rural on the northwestern tip of the island of Newfoundland. The region has been inhabited for at least 6,000 by Indigenous Peoples such as the Maritime Archaic and Dorset, Vikings, and most recently predominantly English and Irish Europeans (Higgins, 2009; Parks Canada, 2021), while many residents today claim Mi'kmaq identity (The Telegram, 2018). The region boasts vast resources of fish and forests, which brought the first European settlers in the late 1800s. Sir Wilfred Grenfell, a philanthropist, established a mission and educational and health services in the region, to improve the lives of fishermen and their families on the Northern Peninsula and Labrador (Wood and Lam, 2019).

Since the 1992 groundfish moratorium that shook the entire province's economic foundations (Schrank and Roy, 2013), the region has faced significant challenges including population decline and above-average dependency on government transfers (Community

Accounts, 2020c). Based on the former St. Anthony-Port au Choix Rural Secretariat Region (see Figure 1), the Census population for the region in 2016 was 11,315, representing a 7.6% population decrease in the region from 2011-2016, while over the same period the provincial population increased by 1.0% (Community Accounts, 2020c). The median age for the region in 2016 was 52, while the provincial median age was 46 (Community Accounts, 2020c). Nonetheless, the region has many assets that are not reflected in prevailing socio-economic indicators, such as a strong sense of place, social capital and trust among residents, and cultural heritage sites of national and international significance (Parill, White, Vodden, Walsh, & Wood, 2014). The region also continues to rely heavily on subsistence livelihoods such as small-scale agriculture, hunting, and fishing – which are not captured in official indicators (Lowery et al., 2021), and has a small but dedicated group of entrepreneurs and support staff who are exploring innovative solutions to entrepreneurship support such as digital hubs (Perez et al., in press).

Chapter 3 examined the innovation context and the applicability of an RIS approach to the GNP. It focused on the application of the RIS/S3 model to the region. Key findings include that: 1) the region has a weak knowledge infrastructure and lacks strong entrepreneurial culture; 2) while evidence of collaboration among local provincial and federal government officials and regional development partners was found, municipalities and entrepreneurs lacked the capacity to engage in and support these development efforts. The Chapter concluded that: 1) efforts should be focused on building capacity and providing additional resources for strengthening local governance; 2) governments and support organizations should support strengthening entrepreneurial collaboration through local network development; 3) development partners should facilitate local efforts to build external connections; 4) the benefits associated with the RIS focus on the quadruple helix and S3 models are impeded by the lack resources in small and

dispersed communities; 5) the region has a history of the not-for-profit sector leading development initiatives through organizations like Grenfell Historic Properties and St. Anthony Basin Resources Inc., and these community-led entrepreneurial initiatives can have significant economic and social impacts that partially make up for a weaker private sector and municipal services; and finally, 6) the case study showed a lack of planning with respect to regional development, which is a key component of S3.

Insights from Chapter 3 are embedded in the model presented in Table 4. Factors in the model address 1) strengthening connections to universities/colleges, 2) ensuring strong governance, including place and asset-based planning processes across the quadruple helix partners, strengthening external connections outside the region through knowledge, mentoring, and markets, 3) broadening the understanding of entrepreneurship to include community and social entrepreneurship; and 4) stressing the need for planning.

### *4.1.1 Applying the Proposed Model to the Region*

In terms of the model, the Great Northern Peninsula is in the pre-ecosystem stage, *so not an ecosystem*, and the goal should be to work towards the nascent stage. In the following bullets, for illustrative purposes, I give an overview of how the factors in the model could apply to the region. These outline a range of activities that could be considered and issues needing to be addressed.

- Finance/Markets: There is little evidence of private financing or access to venture capital in the region. A starting point on financing could include bringing together entrepreneurs and governments to discuss how private equity could be coupled with government funds to support development initiatives (startups and social enterprise). A group of investors could be formed to whom entrepreneurs could pitch startup ideas. Infrastructure in the

region is limited, though the cold storage and port in St. Anthony potentially link the region to world markets and could be the basis of new export-oriented startups. An ecosystem leadership team, as described in the next bullet, could prioritize infrastructure development in the region that would spur new startups.

- Governance: Chapter 3 noted that there is limited capacity for planning. Previously the Regional Economic Development Boards played this role but were disbanded (see Chapter 3). An ecosystem leadership team, comprised of entrepreneurs, government officials, community leaders and support organizations would help lead the implementation of the model described here. Chapter 3 found that community and entrepreneurs have limited capacity to participate in governance activities so this is a significant issue to be overcome. Additionally, the ecosystem leadership group could play an advocacy role with governments for regional funding supports as well as policy change.
- Connecting: Chapter 3 showed a lack of entrepreneurial engagement with other partners in the region. A previous entrepreneurial group, the Northern Peninsula Business Network, had flourished for a few years with trade trips to Greenland, a range of innovative learning activities related to lean manufacturing and export development (White & Hall, 2013). The network eventually folded but showed the potential for more entrepreneurial collaboration. Reviving the network approach could lead to new learning and export opportunities. Chapter 3 showed a lack of knowledge infrastructure (one CNA campus) and strengthening connections to Memorial University (the region is currently engaged in several research initiatives) and other research/learning institutions.

- Metrics: An analysis of the current state of entrepreneurship in the region could be undertaken as a starting point with subsequent iterations showing improvement or decline over time. The Memorial University could be a partner on this.
- Activities/ space: Entrepreneurial events have taken place over the past few years through the local Chamber of Commerce as well as events sponsored through Grenfell Campus's Navigate Entrepreneurship Centre. New events could include participating in external startup events online, organizing smaller startup weekends in the region. Local support partners could provide co-working space for entrepreneurs where they could meet and work on startup ideas. Learning events could be sponsored to build capacity among aspiring and more seasoned entrepreneurs as well as social enterprises.
- Communications: The region could start by 1) communicating key strengths and assets of the region, and 2) encouraging startups related to opportunities related to these assets. The leadership team could use social media and a new website to champion entrepreneurship and celebrate private and social entrepreneurs.
- Values: Chapter 3 showed that the region has a weak entrepreneurial culture with limited entrepreneurs spread out over long distances. Finding ways to connect virtually to spur more interaction would help. Additionally local and nonlocal successful entrepreneurs could play an important role to mentor new startups. Chapter 3 also showed that the region has a strong history of community-led entrepreneurial initiatives (through Grenfell and more recently SABRI) so this area of collective action could play an even more important role in local development.

### *4.1.2 Entrepreneurs in the Region*

There are successful entrepreneurs in the region, some established and others emerging. For example, the Dark Tickle Company makes artisan jams, teas, and other food products with local ingredients and sells them through an online store, as well as offering an experiential tourism product featuring an underwater remote operated vehicle (Dark Tickle, 2022). The company pivoted from being a fish buyer and general store in a small community on the tip of the Northern Peninsula to a manufacturing tourism business. Dark Tickle has expanded to include tourism expeditions as well as opening Café Nymphe, where customers can try their unique local products (Dark Tickle, 2022). Many businesses in the region have no online presence, while Dark Tickle takes full advantage of digital marketing and distribution channels to connect their products and services with customers at national and international scales. They also have innovated through use of both underwater camera technology in their marine experiences as well as drone footage on their website.

Another tourism initiative is Moratorium Children, a social enterprise in Conche on the eastern side of the Northern Peninsula, telling the story of the fishery closure and its impacts on rural parts of the province. Moritorium Children undertakes extensive social media and marketing efforts to reach customers in the province and elsewhere positioning itself as a high-end retreat experience. Toni Kearney has been operating the social enterprise for the past three years featuring single day to multi-day experiences. This luxury retreat includes accommodations in Conche through redeveloped local housing. Toni Kearney a “been away” having lived and experienced tourism in Australia where she learned tourism industry skills and has incorporated local assets and food experiences into her business model (CBC, 2021).

St. Anthony Basin Resource Inc. (SABRI) is an example of a successful not for profit in the region. SABRI has a broad of directors made up of fish harvesters and plant workers representing 16 communities from North Boat Harbour to Goose Cove on the Great Northern Peninsula. SABRI was granted a community shrimp quota of 3000 metric tons in 1997. The allocation of shrimp provided significant revenue to support development initiatives, including investments in the local fish plant, a cold storage attracting both fishing industry business, tourism infrastructure development, and most recently seniors housing. SABRI also recently supported constructing two LTE towers in a previously unserved area (SABRI, 2022). SABRI has significant potential as a social enterprise to continue to support new development in the region.

### *4.2 Corner Brook Sub-region*

In contrast to the GNP, the Corner Brook-Humber region is the urban centre of Western Newfoundland and a hub of commercial and public services for more remote regions like the GNP. The region consists of the City of Corner Brook, the Bay of Islands, and the Humber Valley (see Figure 1). It includes the communities on both shores of the Bay of Islands and the communities between Corner Brook and Deer Lake, including Cormack and Reidville. The region encompasses most of the Corner Brook Functional Economic region (see Freshwater et al., 2014), representing one of 29 small cities and regional towns in Atlantic Canada. This region coincides with the lower portion of the former Corner Brook-Rocky Harbour Rural Secretariat Region.

The regional population as of 2016 was 39,003 residents (about the population of Charlottetown, PEI); the largest municipality is the City of Corner Brook (19,806) and the smallest is Hughes Brook (255). The regional population has grown by 1.6% since 2011

(Community Accounts, 2020a). Much of this population growth has occurred in the outlying communities surrounding Corner Brook, such as Pasadena and Massey Drive, which have experienced suburban growth while Corner Brook itself has declined in population by 0.4%. Furthermore, small communities along the shore of the Bay of Islands have experienced significant population decline, with up to 5% decline between 2011-2016 in some communities. The median age of the region is 49 years, with the youngest community of Mount Moriah (46) and the oldest being Cormack (51).

The region has a significant Indigenous population represented by the Qalipu First Nation, established in 2011 under the Indian Act of Canada. The overall federally recognized Qalipu population in NL is 23,435, living in 67 communities in western and central Newfoundland (Canadian Encyclopedia, 2020). The Qalipu are Mi'kmaq peoples with ancestry connected across Atlantic Canada (Canadian Encyclopedia, 2020). In addition, there are many self-identifying Mi'kmaq people in the region who do not hold official Indigenous status with Qalipu.

Chapter 4 presented a case study of the entrepreneurial ecosystem of the Corner Brook region. Conducted as a comparative analysis along with the St. John's metropolitan area, this study surveyed ecosystem actors from the region including entrepreneurs, government officials, university/college academics, and community members. Chapter 4 used social network analysis to map the entrepreneurial ecosystem of the Corner Brook region based on knowledge-seeking behaviors of ecosystem actors. The study thereby applied the ecosystem model to a less-favoured, resource-based, peripheral region with a significant Indigenous population.

Audretsch (2015) suggests that the entrepreneurial ecosystem model offers a more complete conceptualization of the role of entrepreneurship in regional development and,

therefore, has greater potential to foster economic development in rural regions due to its stronger focus on entrepreneurship (versus the core focus in RIS on interactions among key quadruple helix actors). Chapter 4 showed that: 1) the ecosystem literature is focused on high-growth tech-based firms, while in less-favoured regions, other sectors and assets dominate and therefore a broader view of the ecosystem is required; 2) the Corner Brook region was in the nascent or early stage of the adapted Cukier et al. (2015) model; 3) in rural and peripheral areas, entrepreneurial ecosystems are likely to be nascent in terms of evolution, and require significant nurturing and support form governments, relevant NGOs, and universities; 4) while the ecosystem model has promise for less-favoured regions, a fit-for-purpose model is required for these regions that adapts the model to different circumstances and realities; and concludes that 5) that there is a need for a multi-dimensional conception of entrepreneurial impact that situates entrepreneurship within a more holistic regional development agenda.

The findings of Chapter 4 align with the model presented here by showing that there is a need to: 1) broaden the understanding of the ecosystem to include regional strengths and assets in a broad and inclusive way (i.e., not just tech-based high-growth firms); 2) develop a stage-based model to describe the evolutionary processes for strengthening regions that includes a pre-ecosystem stage that would be more relevant to many less-favoured regions; and 3) broaden the understanding of entrepreneurship and its role in the overall development agenda.

### *4.2.1 Applying the proposed Model to the Region*

- Financing/markets: Corner Brook has had some startup pitching events over the past few years and there is an informal angel network in the region that was referenced in Chapter 3 surveys. To move to beyond the nascent stage, the region needs more and regular

connectivity between startups and local angels as well as venture capital e.g., Pelorus Venture Capital and Killick Capital. New infrastructure such as the Centre for Research and Innovation (CRI, 2022) will house the Navigate business incubator and makerspace. The new off-campus site offers potential to strengthen the relationship between Corner Brook Pulp and Paper and CNA, Grenfell and the region while enhancing entrepreneurial supports.

- Governance: There are informal entrepreneur led groups operating in the region to support the ecosystem, including Humber Valley Entrepreneurs and Navigate Entrepreneurship Centre's ecosystem discussion series. Beyond these a leadership team led by entrepreneurs, post-secondary institutions, government officials and key support agencies would ensure more regular meetings and support for activities and initiatives. More lobbying of the provincial and federal governments is needed to drive government investment and policy change.
- Connecting: Chapter 4 showed limited peer-to-peer connections among entrepreneurs and few external connections in the Corner Brook region. More training and social events targeting entrepreneurs in the new CRI space could help with the first issue. Supporting more visitors and sharing of national and international contacts would also help with global connections and export development.
- Metrics: There has been some work on mapping entrepreneurship in the region (e.g., Chapter 4). Further study and analysis would support a better understanding of what is needed. The goal would be to capture the evolution of the ecosystem and to support more interventions. The Grenfell Campus Business faculty have the capacity to undertake this research.

- Activities/space: Navigate Entrepreneurship Centre, NLOWE, Futurpreneur, the CBDC and other support organizations are working in the region to ensure regular events. These efforts are well aligned, though more events across these support organizations would help move the ecosystem to the next stage. More capacity building is needed to ensure the right skills are in the region. Grenfell Campus and CNA can target training, certificates and micro credentials to help ensure digitization, creativity, prototyping and business skills are available it the local labour market.
- Communications: There are numerous actors from the ecosystem regularly posting on social media and success stories are emerging. These need to be more frequent and include more on opportunities resulting from key assets (e.g., port containerization, available waste streams from fish and forests etc.). The region is ready for a dedicated communications platform to support entrepreneurs and support agencies.
- Values: Chapter 4 suggested that the presence of CBPPL as a major well paying industry has perhaps stifled an interest in entrepreneurship in the region. However, CBPPL is now a key partner in the new CRI, and, as a local anchor firm, can play an important role in mentoring and supporting new startups.

### *4.1.2 Entrepreneurs in the Region*

Jason Janes is a serial entrepreneur in the Corner Brook region. Jason has solved the problem of safety in barbecuing where wire bristles on scrapers were causing health issues for users. Juniper BBQ Scraper produces a bristle free safe alternative to metal scrapers with the tag line Safe - Natural – Clean (Juniper BBQ Scrapers, 2022). He has been shipping across Canada and exporting out of the country. The higher value product uses Juniper that is most often used as firewood. Jason

is also an active ecosystem supporter as a founder of Western NL Entrepreneurs and previously a co-founder of Startup NL.

Louis McDonald is an Indigenous entrepreneur in the Bay St. George Region. He has collaborated with Grenfell Campus' Functional Foods Lab in Corner Brook to produce Atlantic Canadian Kabayaki, a Japanese eel delicacy. The product is exported as a ready to eat product to Japan as well as within Canada to Asian Canadian customers (Gill, 2019). The collaboration with the Functional Foods Lab has also led to the incorporation of local berries in the recipes and supports health claims for this functional food (Gill, 2019).

## 5. Discussion and Conclusions

This Chapter has discussed the benefits of merging system-level innovation models with entrepreneurial models focused more on individual agency and entrepreneur-driven innovation. While there are clear benefits to this merging of RIS and entrepreneurial ecosystems, Chapters 3 and 4 outline the challenges of applying such urban-based TIMs in less favoured regions and demonstrate the need for a model tailored to the unique contextual factors facing these regions. Therefore, this Chapter has addressed the gaps identified in previous Chapters by proposing such a model, which integrates empirical lessons from the previous Chapters of this dissertation.

Difficulties in less favoured regions are deep, enduring, and complex, with no quick fixes for shifting course towards a new economic development path. To guide regions in this process, models have been developed to support regional economic development and help support the evolution of localized entrepreneurial ecosystems. This Chapter asserts that, compared to RIS models, entrepreneurial ecosystems offer a better understanding of the role of entrepreneurship in regional development, while RIS has advantages related to planning

processes and building on strengths and assets. Both models have underlying issues with applying them in rural and peripheral contexts. First, in less favoured regions these models need to shift away from focusing on high growth entrepreneurship (Mason and Brown, 2013) since there are fewer of these firms in less favoured regions. Second, these models need to include social and community-based entrepreneurship as important components of entrepreneurial processes in rural and peripheral regions (Steiner & Teasdale, 2020), while advancing efforts to create a more inclusive view of entrepreneurship (Welter et al., 2017). Third, this Chapter addressed critiques of RIS in less favoured regions, which requires strong partners (universities, government presence and capital, critical mass of firms) that are often not present in rural places. The novel model proposed here underlines that advocating for more connections among partners, though critically important, is not adequate for addressing system-level gaps in less favoured regions and fails to acknowledge the vital role of entrepreneurship in economic development.

In conclusion, this Chapter contributes to the literature on TIMs by proposing a novel model for innovation and entrepreneurship in less favoured regions that addresses limitations of more urban-centric models, which previous Chapters have shown to have limited applicability in less favoured regions. By considering the significant challenges facing remote, rural and peripheral regions - which are very different than urban settings – as well as unique capabilities in these regions such as social capital and intangible cultural assets, this Chapter has underlined the need for more nuanced approaches to innovation and entrepreneurship in less favoured regions. The model proposed here borrows from both RIS and entrepreneurial ecosystems models, with the benefit of incorporating strengths from each and those components most relevant to the regions this dissertation reviewed. The model also identifies the key factors and the description of a pre-ecosystem stage not recognized in other ecosystem, but a stage many less

favoured regions would find themselves in. The model proposed begins from a stronger theoretical foundation of innovation in less favoured regions while offering practical guidance to support public policy and practice in these contexts.

The case studies from Chapter 3 and 4 then provided an opportunity to apply the model in these contexts and to illustrate how it could point to new ways to evolve the respective regions. While these efforts are cursory and limited, they do point to new directions for the regions and suggest that the model can support collective ecosystem action in places like Corner Brook and the Great Northern Peninsula.

Future research based on this study would apply the model to less favoured regions. These could include more rural and smaller city locations with more reliance on partners that include small business, social enterprise and natural resource-based firms. The model would be less applicable to urban settings where more traditional innovation models would be better suited.

**References**

Acs, Z. Stam, E. Audretsch, D., & O'Connor A. (2017). The linkages of the entrepreneurial ecosystem approach. Small Business Economics: An Entrepreneurship Journal, 49(1): 1-10.

Ahmad, N., & Hoffman, A. (2008). A Framework for addressing and measuring entrepreneurship, OECD Statistics Working Paper No. 2, Organization for Economic Co-operation and Development.

Antonopoulos, C. N., Papadakis, V. G., Stylios, C. D., Efstathiou, M. P., & Groumpos, P. P. (2009). Mainstreaming innovation policy in less-favoured regions: The case of Patras Science Park, Greece. *Science & Public Policy*, 36(7), 511-521.

Arias Schreiber M, Wingren, I. & Linke, S. (2020). Swimming upstream: community economies for a different coastal rural development in Sweden. Sustainability Science 15(1): 63–73. DOI: 10.1007/s11625-019-00770-0.

Asheim, B. T., Boschma, R., & Cooke, P. (2013). Constructing Regional Advantage: Platform Policies Based on Related Variety and Differentiated Knowledge Bases. *Regional Studies*, 45 (7), 893-904.

Audretsch, D., (2015) *Everything in its pace: entrepreneurship and the strategic management of cities, regions and states*. Toronto: Oxford University Press.

Bailey, D., Clark, J., Colombelli, A., Corradini, C., De Propris, L., Derudder, B., Usai, S. (2020). Regions in a time of pandemic. *Regional Studies*, *54*(9), 1163–1174. https://doi.org/10.1080/00343404.2020.1798611

Bathelt H., Malmberg A., and Maskell P. (2004). Clusters and knowledge: Local buzz, global pipelines and the process of knowledge creation. *Progress in Human Geography* 28: 31-56.

Beeton, T. A., & Galvin, K. A. (2017). Wood-based bioenergy in western Montana. *Ecology and Society*, 22(2), 9.

Bell, D., & Jayne, M. (2009). "Small cities? Towards a research agenda." International Journal of Urban and Regional Research, 33(3), 683-699.

Bell, D., & Jayne, M. (2010). The creative countryside: Policy and practice in the UK rural cultural economy. *Journal of Rural Studies*, *26*(3), 209–218. https://doi.org/10.1016/j.jrurstud.2010.01.001

Bollman, R. D. (2016). *Charts: Population levels and trends – Census Metropolitan Areas (CMAs), Census Agglomerations (CAs), Rural and Small Town (RST) Areas by province, 1966-2016*.

Bosworth, G., Price, L., Collison, M. & Fox, C. (2020). Unequal futures of rural mobility: Challenges for a "Smart Countryside". Local Economy, 35(6), 586-608.

Bramwell A (2021) Inclusive innovation and the "ordinary" city: Incidental or integral? *Local Economy,* 36(3): 242–264. DOI: 10.1177/02690942211019005.

Breen, S., Markey, S., & Reimer, B. (2019). Regional development in Canada: Eras and evolution. In: *The Theory, Practice, and Potential of Regional Development: The Case of Canada*. New York: Routledge, pp. 12–29.

Butters, L., Romero, A., Abdulai, A. R., Evans, S., Islam, N., Oppong, A., Echikwonye, O. (2016). *Our Way Forward: Sharing Knowledge and Building Capacity for Regional*

*Development*. Retrieved from Grenfell Campus, Memorial University website: http://cdnregdev.ruralresilience.ca/?page_id=462

Canadian Broadcasting Corporation, (2021). *Children of the moratorium: Why this woman wants to bring her hometown to the world*. Retrieved September 10, 2022, from: https://www.cbc.ca/news/canada/newfoundland-labrador/moratorium-children-1.5905386

Carter, K., Newell, W.J. & Winsor, B. (2021). The anatomy, possibilities and challenges of a peripheral entrepreneurial ecosystem. Unpublished paper.

Carter, K., Vodden, K., (2017). Applicability of Territorial Innovation Models to Declining Resource-Based Regions: Lessons from the Northern Peninsula of Newfoundland. Journal of Rural and Community Development, 2 (2): 74-92.

Community Accounts. (2020a). St. Anthony-Port Aux Choix Rural Secretariat Region Profiles. Retrieved June 21st, 2021, from https://nl.communityaccounts.ca/profiles.asp?_=vb7En4WVgbWy0nI_

Community Accounts. (2020b). Economic Zone 8 Profiles. Retrieved June 21st, 2021, from https://nl.communityaccounts.ca/profiles.asp?_=vb7En4WVgb2uzqVq

Cooke, P., & Morgan, K. (1998). The associative region. Oxford, United Kingdom: Oxford University Press.

Cooke, P. (2012) Relatedness, Transversality and Public Policy in Innovative Regions, European Planning Studies, 20:11, 1889-1907.

Cukier, D., Kon, F., & Krueger, N. (2015). Towards a software startup ecosystems maturity model. Technical report RTMAC-2015-03. São Paulo: University of São Paulo, Department of Computer Science.

Dark Tickle. (2022). *Iceberg, Whale, Dolphin and Seabird Tours*. Retrieved September 10, 2022, from https://www.darktickle.com

Del Castillo J., Barroeta B., Itziar U. (2002). Regional Innovation Strategies: The Key Challenge for Castilla y León as one of Europe's Less-Favoured Regions in K. Morgan & C. Nauwelaers (Eds.). *Regional Innovation Strategies* (Regional policy and development series) (pp. 115-132). London: Routledge.

Doloreux, D., & Parto, S. (2005). Regional innovation systems: Current discourse and unresolved issues. Technology and Society, 27, 133-153.

Doloreux, D., Dionne, S. & Jean, B. (2007). The Evolution of an Innovation System in a Rural Area: The Case of La Pocatière, Québec. *International Journal of Urban and Regional Research*, 31(1): 146–167. DOI: 10.1111/j.1468-2427.2007.00707.x.

du Plessis, V., Beshiri, R., & Bollman, Ray. D. (2001). Definitions of rural. *Rural and Small Town Canada Analysis Bulletin*, *3*(3), 1–17.

Eder, J. (2018). Innovation in the periphery: A critical survey and research agenda. *International Regional Science Review*, 42 (2), 119-146.

Emery, M. & Flora, C. (2006). Spiraling-Up: Mapping Community Transformation with Community Capitals Framework. *Community Development,* 37(1): 19–35. DOI: 10.1080/15575330609490152.

Farrell, E., & Dennison, N. (2016). *Quantitative analysis of the Atlantic entrepreneurial ecosystem's innovation activities*. Working Paper Series No. 2016-03. Halifax: Sobey School of Business.

Farrell, E., (2016). Weak ties and global reach: network theory and the Atlantic entrepreneurial ecosystem. Working Paper Series No. 2016-01. Halifax: Sobey School of Business.

Feld, B. (2012). *Startup communities: Building an entrepreneurial ecosystem in your city*. Hoboken NJ: John Wiley & Sons.

Floysand, A., & Jacobsen, S. (2010). The Complexity of Innovation: A Relational Turn. *Progress in Human Geography*, 35(3), 328-344.

Flyvbjerg, B. (2006). Five misunderstandings about case-study research. *Qualitative Inquiry*, *12*(2), 219–245.

Foray, D, Goddard, J, Xabier, G. B., Landabaso, M., McCann, P., Morgan, K., Nauwelaers, C. & Ortega-Argilés, R. (2012). Guide to Research and Innovation Strategies for Smart Specialisation (RIS 3). Luxembourg: European Union.

Foster, G., Shimizu, C., Ciesinski, S., Davila, A., Hassan, S., Jia, N., & Morris, R. (2013, September). *Entrepreneurial ecosystems around the globe and company growth dynamics*. World Economic Forum (Vol. 11).

Grabher, G. (2018). Marginality as strategy: Leveraging peripherality for creativity. *Environment and Planning A: Economy and Space*, 50(8), 1785-1794.

Graffenberger, M. & Vonnahme, L. (2019). Questioning the 'periphery label' in economic geography: Entrepreneurial Action and Innovation in South Estonia. *ACME: An International Journal for Critical Geographies*, 18(2): 529–550.

Grenfell Campus. (2022). Centre for Research and Innovation. Retrieved September 10, 2022 from https://www.grenfell.mun.ca/academics-and-research/Pages/centre-for-research-and-innovation.aspx

Grillitsch, M. & Sotarauta, M. (2020). Trinity of change agency, regional development paths and opportunity spaces. *Progress in Human Geography*, 44 (4), 704-723.

Halfacree, K. (2007). Trial by space for a "radical rural": Introducing alternative localities, representations and lives. *Journal of Rural Studies*, *23*(2), 125–141. https://doi.org/10.1016/j.jrurstud.2006.10.002

Hall, H. (2017). Exploring Innovation in Northern Canada with Insights from the Mining Innovation System in Greater Sudbury, Ontario. *The Northern Review*, (45): 33–56. DOI: 10.22584/nr45.2017.003.

Hall, H. & Donald, B. (2009). *Innovation and creativity on the periphery: Challenges and opportunities in Northern Ontario*. Working Paper Series: Ontario in the Creative Age. REF. 2009-WPONT-002.

Heritage Foundation of Newfoundland & Labrador. (2020). People, Places, and Culture. Retrieved April 14, 2020, from https://heritagefoundation.ca/programs/ppc/

Hewitt, C., Haan, M., & Neis, B. (2018). *Interprovincial employees from Newfoundland and Labrador, 2005-2014*. Retrieved from On the Move Partnership website: https://www.onthemovepartnership.ca/results/reports/

Higgins, J. (2009). *Irish settlement patterns*. Available at: https://www.heritage.nf.ca/articles/society/irish-settlement.php (accessed 3 August 2020).

Holisko, S. & Vodden, K. (2015). *Assessing the factors impacting the sustainability of the Clarenville-Bonavista Rural Secretariat Region: Phase two final report*. Corner Brook, NL: Grenfell Campus, Memorial University of Newfoundand.

Holmen, A. K. T., & Fosse, J. K. (2017). Regional agency and constitution of new paths: A study of agency in early formation of new paths on the west coast of Norway. *European Planning Studies*, *25*(3), 498–515. https://doi.org/10.1080/09654313.2016.1276159

Horlings, L. & Marsden, T.K. (2013). Exploring the 'new rural paradigm' in Europe: Ecoeconomic strategy as a counterforce to the global competitiveness agenda. *European Urban and Regional Studies*, 21(1), 4-20.

Interreg Europe. (2019). *The entrepreneurial discovery process – the S3 engine*. European Union. Accessed at: https://www.interregeurope.eu/policylearning/news/6598/the-entrepreneurial-discovery-process-the-s3-engine/?no_cache=1&cHash=bc492f7fda52c2cc7846dfea6f0df0ac

Interreg Europe. (2020). *Smart Specialisation Strategy (S3): A policy Brief from the Policy Learning Platform on Research and innovation. European Union: European Regional Development Fund*. Accessed at: https://www.interregeurope.eu/fileadmin/user_upload/plp_uploads/policy_briefs/Smart_Specialisation_Strategy__S3__-_Policy_Brief.pdf

Isenberg, D. (2010). How to start an entrepreneurial revolution. *Harvard Business Review*, 88(6): 40-50.

Isenberg, D. (2011). When big companies fall, entrepreneurship rises, Harvard Business Review. Accessed at: http://blogs.hbr.org/2013/03/when-Big companies-fall-entrep/

Janssen, Frank. 2009. "Does the Environment Influence the Employment Growth of SMEs?" *Journal of Small Business and Entrepreneurship,* 22(3) p.311–26.

Johnstone, H., & Lionais, D. (2004). Depleted communities and community business entrepreneurship: Revaluing space through place. *Entrepreneurship & Regional Development*, *16*(3), 217–233. https://doi.org/10.1080/0898562042000197117

Jones, C. (2010). Less and Less Favoured? Britain's Regions in the Energy Crunch. *Environment and Planning*. A, 42(12), p.3006-3022.

Kolehmainen, J., Irvine, J, Stewart, L., Karacsonyi, Z., Szabó, T., Alarinta, J., & Norberg, A. (2016). Quadruple Helix, Innovation and the Knowledge-Based Development: Lessons from Remote, Rural and Less-Favoured Regions. *Journal of the Knowledge Economy*, 7(1), 23-42.

Koltai S. R. (2016). International entrepreneurship ecosystem development. Koltai & Co. LLC. Accessed at: https://www.koltai.co

Korsgaard, S., Ferguson, R. & Gaddefors, J. (2015). The best of both worlds: how rural entrepreneurs use placial embeddedness and strategic network to create opportunities, *Entrepreneurship & Regional Development*, 27(9-10), 574-598.

Kühn, M. (2015). Peripheralization: Theoretical Concepts Explaining Socio-Spatial Inequalities. *European Planning Studies*, 23(2), 367-378.

Lauzon, A., Bollman, R. D., & Ashton, B. (2015). Introduction. In *State of Rural Canada* (1st edition, pp. 1–8). Canadian Rural Revitalization Foundation.

Lowe, N.J. & Feldman, M.P. (2017). Institutional life within an entrepreneurial region. *Geography Compass* 11(3). DOI: 10.1111/gec3.12306

Lowery, B., Dagevos, J., Chuenpagdee, R., & Vodden, K. (2020). Storytelling for sustainable development in rural communities: An alternative approach. *Sustainable Development*, 28(6), 1813-1826. https://doi.org/10.1002/sd.2124

Malecki, E. (2018). Entrepreneurship and entrepreneurial ecosystems. Geography Compass, 12(3): 1-12.

Markey, S., Connelly, S., & Roseland, M. (2010). 'Back of the Envelope': Pragmatic Planning for Sustainable Rural Community Development. *Planning Practice and Research,* 25(1): 1–23. DOI: 10.1080/02697451003625356.

Markey, S., Breen, S., Vodden, K., et al. (2019) Identity and commitment to place: How regions 'become' in rural Canada. In: *The Theory, Practice, and Potential of Regional Development: The Case of Canada*. New York: Routledge, pp. 102–122.

Marti, I., Courpasson, D., & Dubard Barbosa, S. (2013). "Living in the fishbowl". Generating an entrepreneurial culture in a local community in Argentina. *Journal of Business Venturing*, *28*(1), 10–29. https://doi.org/10.1016/j.jbusvent.2011.09.001

Gill, Pamela. (2019). Understanding Food: Functional Foods Sensory Laboratory officially opens at Grenfell Campus. *Memorial University Gazette*. February 15. Retrieved September 10, 2022, from https://gazette.mun.ca/research/understanding-food/

Meyer, C. (2020). The commons: A model for understanding collective action and entrepreneurship in communities. *Journal of Business Venturing*: 19.

Mommaas, H., & Janssen, J. (2008). Towards a synergy between 'content' and 'process' in Dutch spatial planning: The Heuvelland case. *Journal of Housing and the Built Environment*, 23(1), 21–35. https://doi.org/10.1007/s10901-007-9102-9

Morgan, K., & Nauwelaers, C. (2002). *Regional Innovation Strategies (Regional policy and development series).* London: Routledge.

Morgan, K. (2007). The Learning Region: Institutions, Innovation and Regional Renewal. *Regional Studies*, 41(1), 147-159.

Moreira, P., Mullen, A. & Moreira, C. (2021). 2020 Atlantic Canadian Startup Data Report. *Entrevestor*. Available at: https://entrevestor.com/2020-data-report

Natário, M., Braga, A., Daniel, A., Rosa, C., & Salgado, M. (2017). Using a Triple Helix approach to examine interactions and dynamics of innovation in less-favoured regions. *Industry & Higher Education,* 31(6), 351-359.

Nieth, L., Benneworth, P., Charles, D., Fonseca, L., Rodrigues, C., Salomaa, M., & Stienstra, M. (2018). Embedding entrepreneurial regional innovation ecosystems: Reflecting on the role of effectual entrepreneurial discovery processes. *European Planning Studies*, 26(11), 2147-2166.

Oliveira, E. (2016). Place branding as a strategic spatial planning instrument: A theoretical framework to branding regions with references to northern Portugal. *Journal of Place Management and Development*, 9 (1), 47-72.

Paasi, A. (2010). Commentary. *Environment and Planning A: Economy and Space*, *42*(10), 2296–2301. https://doi.org/10.1068/a42232

Paré, G., Trudel, M.-C., Jaana, M., & Kitsiou, S. (2015). Synthesizing information systems knowledge: A typology of literature reviews. *Information & Management*, *52*(2), 183–199. https://doi.org/10.1016/j.im.2014.08.008

Perez M, Mendis, R. and Newell, W. (in press) Rethinking enterprise hubs: A case study on overcoming the challenges of connectivity in rural Canada. *Journal of Rural and Community Development*.

Pike, A., Rodríguez-Pose, A., & Tomaney, J. (2007). What Kind of Local and Regional Development and for Whom? *Regional Studies*, *41*(9), 1253–1269. https://doi.org/10.1080/00343400701543355

Ratten, V., & Welpe, I. M. (2011). Special issue: Community-based, social and societal entrepreneurship. *Entrepreneurship & Regional Development*, *23*(5–6), 283–286. https://doi.org/10.1080/08985626.2011.580159

Roberts, E., & Townsend, L. (2016). The Contribution of the Creative Economy to the Resilience of Rural Communities: Exploring Cultural and Digital Capital. *Sociologia Ruralis*, *56*(2), 197–219. https://doi.org/10.1111/soru.12075

St. Anthony Basin Resources Inc. (2022). SABRI. Retrieved September 10, 2022, from https://sabrinl.com

Salemink, K., Strijker, D., & Bosworth, G. (2017). Rural development in the digital age: A systematic literature review on unequal ICT availability, adoption, and use in rural areas. Journal of Rural Studies, 54, 360–371. https://doi.org/10.1016/j.jrurstud.2015.09.001

Saxenian, A. (1994). *Regional Advantage*. Cambridge : Harvard University Press.

Simms, A., & Ward, J. (2016). Rural population projections for Labrador & the Northern Peninsula. St. John's, Newfoundland and Labrador, Canada: *Harris Centre Regional Analytics Laboratory*, St. John's Memorial University.

Spigel, B. (2020). *Entrepreneurial Ecosystems: Theory, Practice and Futures*. Northhampton, Massachusetts: Edward Elgar Publishing.

Spigel, B. (2017). The relational organization of entrepreneurial ecosystems. *Entrepreneurship Theory and Practice*, 41(1): 49-72.

Spigel, B., & Harrison, R. (2017). Toward a process theory of entrepreneurial ecosystems. *Strategic Entrepreneurship Journal*, 12: 151-168.

Stam, E. (2015) *Entrepreneurial Ecosystems and Regional Policy: A Sympathetic Critique*. Utrecht University: Tjalling C. Koopmans Research Institute.

Startup Genome. (2020). Project Genome: The Global Startup Ecosystem Report 2020 (GSER 2020). Available at: https://startupgenome.com/report/gser2020

Steiner, A. & Teasdale, S. (2019). Unlocking the potential of rural social enterprise. *Journal of Rural Studies,* 70: 144–154. DOI: 10.1016/j.jrurstud.2017.12.021.

Steiner, A., Farmer, J. & Bosworth, G. (2019). Rural social enterprise – Evidence to date, and a research agenda. *Journal of Rural Studies*, 70, 139-143.

Steinerowski, A. A., & Steinerowska-Streb, I. (2012). Can social enterprise contribute to creating sustainable rural communities? Using the lens of structuration theory to analyse the emergence of rural social enterprise. *Local Economy: The Journal of the Local Economy Policy Unit*, *27*(2), 167–182. https://doi.org/10.1177/0269094211429650

Steyaert, C., & Katz, J. (2004). Reclaiming the space of entrepreneurship in society: Geographical, discursive and social dimensions. *Entrepreneurship & Regional Development*, *16*(3), 179–196. https://doi.org/10.1080/0898562042000197135

Storper, M., & Venables, A. J. (2002). Buzz: The economic force of the city. Paper presented at *Druid Summer Conference: Industrial dynamics of the new and old economy – who is embracing whom?* Copenhagen, Elsinore: Danish Research Unit for Industrial Dynamics.

Sydow, Jörg, Windeler, Arnold, Müller-Seitz, Gordon, & Lange, Knut. (2012). Path Constitution Analysis: A Methodology for Understanding Path Dependence and Path Creation. *Business Research* (Göttingen), 5(2), 155-176.

Thompson, J. (2010). 'Entrepreneurship Enablers' – Their Unsung and Unquantified Role in Competitiveness and Regeneration. *Local Economy*, 25(1), 58-73.

Tödtling, F., & Trippl, M. (2005). One size fits all? Towards a differentiated regional innovation policy approach. *Research Policy*, 34(8), 1203-1219.

Tonts, M., Plummer, P., & Argent, N. (2014). Path dependence, resilience and the evolution of new rural economies: Perspectives from rural Western Australia. *Journal of Rural Studies*, *36,* 362-375.

United Nations. (2018, May 16). 68% of the world population projected to live in urban areas by 2050, says UN. *United Nations Department of Economic and Social Affairs*. Retrieved from https://www.un.org/development/desa/en/news/population/2018-revision-of-world-urbanization-prospects.html

Van de Ven, Andrew. (1993). "The Development of an Infrastructure for Entrepreneurship." *Journal of Business Venturing* 8:211–30.

Vodden, K., Cunsolo Willox, A., Harper, S. L., Kipp, A., King, N., Manners, S., & Rethoret, L. (2020). Rural and remote communities. In: *Canada in a changing climate: National issues*. Retrieved from https://www.nrcan.gc.ca/climate-change/impacts-adaptations/what-adaptation/canada-changing-climate-national-issues/21097

Vodden, K., Douglas, D., Markey, S., Minnes, S., & Reimer, B. (2019). *The theory, practice and potential of regional development: the case of Canada*. New York: Routledge.

Welter, F., Baker, T., Audretsch, D.B. & Gartner, W.B. (2016). Everyday Entrepreneurship - A Call for Entrepreneurship Research to Embrace Entrepreneurial Diversity. *Entrepreneurship Theory and Practice*, 41 (3), 311-321.

White, K. & Hall, H. (2013). The Northern Peninsula Business Network: Cooperation and Innovation. *Canadian Regional Development: A Critical Review of Theory, Practice and Potentials*. Retrieved May 2022, from http://ruralresilience.ca/wp-content/uploads/2013/10/NPBN.pdf

Wolfe, D. A., & Gertler, M. S. (2004). Clusters from the inside and out: Local dynamics and global linkages. *Urban Studies*, 41, 1071-1093.

Woods, M. (2009). Rural Geography: blurring boundaries and making connections. *Progress in Human Geography*, 33 (6), 849-858.

Yin, R. (2009). *Case study research: Design and methods* (Fourth edition). Thousand Oaks, California: Sage.

Younglai, R. (2017, June 8). Automation nation: Which Canadian communities are most at risk? *The Globe and Mail*. Retrieved from https://www.theglobeandmail.com/report-on-business/economy/automation-canada-robots-job-loss/article35233335/

## Chapter 6: Summary and Conclusions

### 1. Overview of Findings

This thesis has reviewed territorial innovation models with the goal of better understanding their applicability to less favoured regions within the context of case study regions on the island of Newfoundland. TIMs are largely focused on successful, urban regions and high growth technology firms, as characterized by Saxian's classic study of Silicon Valley versus Route 128 in Boston (1996). This thesis outlined challenges and opportunities related to applying regional innovation systems and entrepreneurial ecosystems to less favoured regions.

The thesis recognizes the challenges and opportunities of applying models built for very different economic geographies. Applying these models to a remote rural region and a small city with documented poor cultures of entrepreneurship (Walsh & Winsor, 2019) is a monumental task. Previous development efforts have had limited impact and the question remains – how will the application of this model be different? To address this issue, effort was undertaken to review the literature on such places to better understand the obstacles to application of TIMs and the need for a broader perspective on entrepreneurship and innovation within these regions (Welter, Baker, Audretsch et al., 2017; Grillitsch & Sotarauta, 2020). The result of this process, and the key contribution of this thesis, is a 'fit for purpose' model for regions that have been left behind relative to the development of models based on successful regions (see Chapter 5).

The proposed model aims to outline critical factors of development and roles/recommendations for key partners within the two case studies. These factors/recommendations include a broader version of stages of development of ecosystems that supports implementation in less favoured regions by showing criteria and goals for strengthening innovation and entrepreneurship. The integration of the disparate literatures on key success

factors across 1) regional innovation systems and 2) entrepreneurial ecosystems and 3) characteristics of less favoured regions is a key contribution of this thesis to the literature on innovation and entrepreneurship. The thesis includes specific recommendations for the key actors within and outside the regions (e.g., entrepreneurs/local firms, support organizations, governments, and universities/colleges).

## 2. Contribution to Knowledge

There is a knowledge gap related to TIMs and their applicability to less favoured regions. In this dissertation I have reviewed the regional innovation systems and entrepreneurial ecosystems models with their focus on the benefits of agglomeration accruing to cities through critical mass of startups, skilled people, knowledge spillovers, university knowledge dissemination, and capital. These models have prioritized the technology sector and paid less attention to the ability of other sectors to contribute to economic development in meaningful ways. They have also focused on high growth firms at the expense of the contributions of other forms of entrepreneurship (Welter et al., 2017). Most of the application of these models, particularly entrepreneurial ecosystems, has been developed and applied to cities and the technology sector. Places that have neither agglomeration economies nor high growth tech startups attract very little attention. In this study I have reviewed RIS and entrepreneurial ecosystems with respect to less favoured regions, taking key factors from the RIS and entrepreneurial ecosystems models, and adapting, merging and applying these insights to less favoured regions.

The contribution of this thesis is to draw lessons from successful urban regions related to these models and adapt them to less favoured regions. The main contribution to knowledge is the development of a fit for purpose model for both analyzing these regions and giving guidance on

how to evolve the regions and support economic development. This model allows participants and policy practitioners to review where an ecosystem fits within the life cycle including a pre-ecosystem stage particularly relevant to less favoured regions. The thesis also contributes to the call for more empirical work with entrepreneurial ecosystems by using social network analysis to map relationships between ecosystem partners in Corner Brook, Newfoundland.

The model outlines key factors and stages required for developing and guiding regional development policy and practice in a place-based manner. The model is the culmination of the project and the key contribution to knowledge of the dissertation. The model as presented in Chapter 5, builds on findings within the dissertation, particularly the application of the RIS model to the Great Northern Peninsula in Chapter 3, and the mapping of the entrepreneurial ecosystem in Chapter 4. The application of a stage-based model builds on Cukier et al (2015) to both analyze where a region sits in terms of ecosystem development, and to show the pathway forward in the evolution of the ecosystem. A key contribution of the dissertation to the ecosystems literature is the addition of a pre-ecosystem phase of development that acknowledges that less favoured regions often lack the development of important components of an ecosystem. This insight can support these regions without ecosystems in applying lessons and learning from ecosystems models to places that have not benefitted from such an analysis. The model I have developed can support regions to evolve by showing specific areas where the ecosystem may be lacking traction from partners, events or resources.

I want to express both an enthusiasm for the possibilities of the model in supporting less favoured regions as well as a realistic understanding of the work required to support these regions. The following section outlines potential supports for governments, support agencies and other partners in implementing the model.

## 3. Policy Recommendations

In this section I make key recommendations for policy and practice from the findings of the dissertation as they are brought together. These recommendations correspond to areas of policy related to the regions studied and the literature reviewed. They are primarily recommendations for regional development actors in Newfoundland and Labrador including federal and provincial government agencies, university and college supports, regional supports in economic development and mature firms, startups and entrepreneurs. These partners are highlighted in Chapter 2 and include government partners such as the provincial Department of Industry, Energy and Technology, and the federal Atlantic Canada Opportunities Agency (ACOA). Local regional development and entrepreneurship support organizations include Community Business Development Corporations, municipalities, Newfoundland and Labrador, Organization of Women Entrepreneurs, Futurpreneur and others. The key supports for research and learning are Memorial University including Grenfell Campus and the Marine Institute, as well as the College of the North Atlantic. Finally, the models reviewed point particularly to the key/lead role of entrepreneurs and mature firms in strengthening innovation and entrepreneurship.

Chapter 2 outlined an economic context with the Provincial Government suffering from significant fiscal challenges that have been exacerbated by the current pandemic (Government of NL, 2021). Particularly relevant for this study is the high percentage of rural residents and the need to better understand how the province can support less favoured regions that are more dependent on natural resources including fisheries, mining, forestry and agriculture, and including the specific supports for rural entrepreneurs. Reduced oil revenues have led to a fiscal crisis with mounting deficits and dwindling revenues. The current Furey government received the report from the Premier's Economic Recovery Team (Greene, 2021) titled *The Big Reset*,

noting that the province has the highest per capita revenues, spending and debt in Canada along with the oldest population, highest unemployment, greatest health spending per capita and worst health outcomes. The report suggests the Provincial Government does not have to do everything and should rely more on the efforts of economic and social partners to achieve its goals (Greene, 2021). As noted in Chapter 2, the cuts envisioned could be devastating and beg the question whether the report is motivated by a neoliberal agenda and retreat from key roles of government that include ensuring the capacity of other partners are supported by the Federal and particularly the Provincial Government. Previous studies on the provincial context have suggested that the provincial and federal governments have retreated from their responsibilities to rural places (Hall, Vodden & Greenwood, 2017).

However, the report's acknowledgement of the role of other partners mirrors recent studies on innovation that stress the social nature of innovation and the importance of input across governments, universities/colleges, industry and community. Chapter 2 notes that the provincial government dominates the innovation ecosystem landscape and that a legacy of political leaders with strong personalities has inhibited broader engagement with the innovation ecosystem across industry, community, Indigenous and university/college partners. A better system of multi-level collaborative governance would support continuity is needed (Vodden, Douglas, Markey et al., 2019). This coincides with the recommendations of *The Big Reset* that says, the "Provincial Government does not have to do everything…individuals and groups must be empowered to make decisions" (Greene, 2021). However, the lesson from this thesis is that governments must provide the resources and supports to empower groups to do this.

The provincial and federal governments must play a greater role in building capacity through funding mechanisms and other supports to key ecosystem actors to ensure vibrant

interactions among participants as well as the ability to interact. Industry associations, municipalities, community partners, and other interest groups are often starved for funding and survive by broadening their agendas and thereby diluting focus from innovation to what can be funded. This inhibits meaningful innovation ecosystem participation. The university and college are primarily funded through the provincial government and are thereby limited in their ability to give opposing voices when required on innovation policy and practice. A goal of the provincial government should be to champion more diffusion of power and capacity across a wider variety of actors and groups. The province does not always need to lead innovation initiatives but can fund others to do so and thereby increase engagement and ownership through civil society.

While the oil money was flowing, significant investments were made to Memorial University and the College of the North Atlantic (CNA) and the province currently has stronger innovation infrastructure than ever before (see Chapter 2). For example CNA has built the College Innovation Network and multiple centres and capacity for applied research. The Chapter shows Memorial University has doubled the number of engineering students, significantly increased research intensification and expanded graduate program across campuses. This new infrastructure and capacity can have significant impact through applied research undertaken with communities, industry and entrepreneurs. Federal funding available through ACOA, tri-council and newer programs such as MITACS can support applied research that leads to firm and startup-level innovation.

Chapter 2 also shows that both the federal and provincial governments have focused policy on startups with strong results. Policy has moved from largely sectoral approaches to focusing on strengthening the microeconomic underpinnings of firm level growth and particularly supporting high-growth startups (see Chapter 2). An important component of this has

included funding entrepreneurship supports at the university through Genesis, Memorial Centre for Entrepreneurship and Navigate Entrepreneurship Centre. Other organizations such as NLOWE, Futurpreneur and the CBDCs are all part of the entrepreneurial support network within the province. The interview and survey results from Chapter 3 and 4 demonstrate the importance of these support agencies. However, much of this effort has been urban, high-growth and technology centric and more could be done beyond St. John's. Supports to startups, with more networking events like startups weekends and hackathons, create learning events have been shown to work. More supports like these to small business, natural resource and tourism firms and in rural areas would support less favoured regions of the province. As noted in Chapter 2, the economy remains largely resource-based and more emphasis needs to be placed on resource innovation in the places where those resources are – rural Newfoundland and Labrador. Resource benefits agreements natural resource extraction (partcularly oil) could be leveraged to attract financial resources for R&D related to value added production. For example, fisheries value-added has the potential to lead to more use of waste streams for high value products like leather, skin products pharmaceuticals (CBC, 2017).

Our unique culture is mostly successfully leveraged through tourism ads and brings many people to visit rural parts of the province. The province is strong on commitment to place and this can provide a cultural underpinning for innovation, but it remains largely unharnessed (Vodden et al., 2019). The province's culture can be a support for innovation and entrepreneurship with more emphasis on our centuries old ingenuity in surviving in the middle of the harsh Atlantic. Beyond tourism, we are seeing this in applied oceans research that has included world leading commercialization as well as in the bioeconomy with Grenfell Campus's Centre for Research and Innovation (Grenfell Campus, 2021) a partnership with Corner Brook

Pulp and Paper, CNA and the City of Corner Brook and funded by the Provincial and Federal Governments (Government of NL, 2020). The province must undertake a similar cultural shift and emphasis on rural ingenuity that encourages startups, entrepreneurship and commercialization in less favoured regions. This requires more capacity and funding to support regional innovation as well as a broader approach to startups beyond urban technology to include rural resource-based opportunities.

Chapter 3 reviewed the applicability of 'quadruple helix' and regional innovation systems on the Great Northern Peninsula, a rural remote region with strengths in the fishery, forestry and tourism, but also weak in key areas including knowledge infrastructure, entrepreneurial culture and governance structures. A key finding was that the quadruple helix was dysfunctional with key partners in community and the private sector largely absent. Both are critical to fostering innovation and without entrepreneurs and startups, the economy can only survive through direct government transfers. The recommendation here is for the provincial and federal governments to build capacity in the private sector and with local municipalities or regional government and to reduce the frequency of top-down government driven processes. The Northern Peninsula had a flourishing business network ten years ago supported by governments that proved to be an important vehicle for regional growth. Encouraging entrepreneurship and networking among startups through co-working spaces can help strengthen the industry and entrepreneurial voices in regional development efforts. A broader view of entrepreneurship to include the not-for-profit sector can support development initiatives (Welter et al., 2017). The region has a history of community enterprise through Grenfell Historic Properties in St. Anthony and development associations. Community-led entrepreneurial initiatives can support economic development in the absence of the private sector. The university and college system also need to be more

involved in applied research in remote rural areas and require resources to play this role. These recommendations are aimed at creating stronger voices across entrepreneurs, community, university/college and government and more interactions among them as noted in the literature (Foray, Goddard, Xabier et al. 2012; Hall, Walsh, Vodden & Greenwood, 2014).

Chapter 4 shifted from the RIS approach to a focus on entrepreneurial ecosystems through mapping knowledge seeking behavior of entrepreneurs in the Corner Brook region. This newer model has learned from previous system level approaches that many of the solutions to entrepreneurial problems can be found not within the firm but in the region and further beyond (Motoyama & Knowlton, 2017). It has been noted that a strength of the ecosystems approach is its adaptability to very different regions (Schafer and Mayer, 2019). Another strength is the life-cycle approach, where a region can actively support evolving the region to a stronger ecosystem. Finally, the model offers a stronger understanding of the role and importance of entrepreneurship and entrepreneurial supports a region's development.

The connections among ecosystem participants are a critical part of a well-functioning ecosystem. It is important that entrepreneurs be connected to regional and international entrepreneurial networks as well as with entrepreneurial supports and governments, since innovation outcomes hinge on firms interacting with these other actors (Hall, Walsh, Vodden, & Greenwood, 2014; Tappeiner, Hauser, & Walde, 2008). Our mapping of the Corner Brook ecosystem revealed a lack of knowledge seeking between entrepreneurs. This suggests regional firms are failing in a critical component of a successful ecosystem and the ecosystem lacks entrepreneurial leadership. Support organizations, governments and university incubators can all play a role in encouraging more peer-to-peer entrepreneurial interactions by playing a greater facilitation role in the ecosystem. Additionally, the findings show few connections between start-

ups and mature firms, and again, support partners can aid in making these important links. Another finding is that the ecosystem is weakly connected beyond the region. These connections are consistently valorized in the ecosystem and RIS literature, as shown in Chapters 3 and 4. This is another area support for organizations, governments and universities/colleges. In this area, it is important that entrepreneurs and mature firms themselves show more leadership in developing stronger connections.

Linked to the lack of peer-to-peer connections is the weak entrepreneurial culture in the province (Walsh and Winsor, 2019) and more effort needs to be placed on communicating the benefits to entrepreneurs and communities of startups and entrepreneurs. Promoting entrepreneurship and celebrating local entrepreneurs can help. Additionally, the findings point to poor connections to venture capital in the region. This finding supports the idea that agencies and mature firms build private financing beyond the provincial and federal governments. Governments could match regional investment funds that are arms-length in terms of distribution.

The mapping of the Corner Brook region ecosystem in Chapter 4 shows that government agencies, support organizations, the college/university are frequently named by entrepreneurs as actors from whom they seek knowledge. This is positive in terms of knowledge flow within the ecosystem, but it begs the question are these flows crowding out peer-to-peer knowledge seeking and entrepreneurial leadership in the ecosystem. This appears to be evidence of a nascent ecosystem where further evolution requires regional entrepreneurs to interact more and lead the development of the ecosystem.

Chapter 5 is the culmination of the dissertation, building on the learning from the previous Chapters and presenting an adapted model that draws from the literature and findings of

the thesis as well as an understanding of the key characteristics of less favoured regions through a literature review of less favoured regions. A key finding of the previous Chapters is that supporting regional growth includes system-level elements such as quadruple helix interactions, as well as a focus and supports for individual agency particularly through entrepreneurs. RIS focuses more on the system level approaches while entrepreneurial ecosystems struggle to understand system level influences while keeping the centrality of entrepreneurial agency at the centre of the model. In particular, the dissertation attempts to take this systems/agency debate/struggle beyond large cities, high growth firms and the technology sector to less favoured regions and broader conceptions of entrepreneurship to include everyday entrepreneurs and social/community entrepreneurship. Chapter 5 argues that the entrepreneurial ecosystem model is noted for its broad applicability and has potential for being adapted in these ways by drawing heavily on the literature from RIS and less favoured regions.

Chapter 5 reviews the literature showing less favoured regions struggling with economic transitions from primary industries with a need to adapt to these challenges. These regions need models that consider assets and challenges specific to them and acknowledge that these are very different from urban contexts. The Chapter outlined that less favoured regions have unique assets including cultural and heritage assets, a natural resource base and skills associated with these industries and strong social capital and commitment to place. These are often overlooked by models that prioritize agglomeration economies and clusters of economic activity. The RIS model is applicable to less favoured regions and suggests reviewing key assets and strengths including labour skills, infrastructure and other assets from diverse sectors from natural resource extraction to tourism. The RIS literature discussed in Chapter 5 points to finding new paths of development based on previous and existing economic platforms by combining local or extra-

local research capacity with current regional industrial/entrepreneurial strengths through what RIS (and its newer Smart Specialization version) term the entrepreneurial process of discovery. These broadly based planning processes can build consensus around key initiatives that can impact the local economy. This co-planning across quadruple helix partners, which is led by a local mix of social/private entrepreneurial actors, is a key feature of the literature on less favoured regions and a key part of the proposed model. Federal and provincial governments can fund and lend resources and expertise to these processes – but they should not lead them (Isenberg, 2010; Feld, 2012; Greene, 2021). Universities, colleges and other support organizations can also play key roles in these processes since linking knowledge infrastructure to industry/entrepreneurial capacity are a key component of these processes. The proposed model can support new regional development policy with a stronger multistakeholder approach.

The proposed model also draws heavily from the entrepreneurial ecosystems approach. As discussed in Chapter 4, the key point from this model is that entrepreneurs are the central actors in the ecosystem. Entrepreneurial intentions (both individual and social) become the key path to regional development through startups and social enterprises. These intentions need to be nourished by support organizations, governments and universities/colleges and moulded by an understanding of local strengths and assets. Factors from the entrepreneurial ecosystems model include ensuring financing is available to startups, ensuring appropriate governance structures (with entrepreneurs leading), making connections among entrepreneurs and to support actors, ensuring that metrics and research are supported, having ongoing activities and learning, communicating success and building on entrepreneurial culture/values.

Chapter 4 introduced the concept of evolution of ecosystems and much of the literature suggests a basic threshold of entrepreneurial activity to be an ecosystem (or cluster, RIS, etc.).

Since this thesis is focused on less favoured regions, the dissertation introduced an additional relevant phase of ecosystem development for remote and rural regions, the pre-ecosystem phase. This acknowledges that these regions have not met the basic nascent phase where other models begin, and acknowledges some regions need to evolve to this nascent state. This is an important adaptation of TIMs to support less favoured regions in their goal of regional development. This process of evolution of a pre-ecosystem requires interventions and leadership from governments, support organizations and the college/university systems in the absence of entrepreneurs and local governance capacity as outlined in in studying the Northern Peninsula in Chapter 3. Chapter 4 shows that the Corner Brook region, as a nascent ecosystem, requires quite different supports and primarily needs to focus on encouraging more leadership from and interactions among entrepreneurs. This could include encouraging networks of entrepreneurs working together through cohorts within the Navigate Entrepreneurship Centre.

Table 12 in Chapter 5 incorporates key components of less favoured regions, RIS and entrepreneurial ecosystems to form a new model for development within these regions. The process of discovering new pathways to development requires collaborative activities and efforts across a broad range of actors driven by startups, entrepreneurs and social enterprises.

### 4. Limitations and Future Research Opportunities

The study has several limitations. First, it must be recognized that TIMs were not developed for less favoured regions and that applying them in these contexts is fraught with problems and contradictions. Entrepreneurial ecosystems presuppose many interactions among key actors in dense urban spaces. In the case studies provided here, the number of interactions is minicule compared to successful ecosystems. In the case of the GNP there clearly is no ecosysm by any

measure and entrepreneurs are scattered over large distances. In Corner Brook, while this analysis suggested a nascent ecosystem, key issues were identified around: 1) the weak culture of entrepreneurship; the lack of peer-to-peer interactions; and weak leadershiop from etrepreneurs. Additionally the biological metaphor when used with complex adaptive systems to understand entrepreneurial ecosystmes requires consistency (Roundy, Bradshaw, Brockman, 2018). These scholars suggest ecosystems are characterized by self-organization, have many complex components, and change through positive feedback loops from interactions. Corner Brook and St. Anthony might one day reach this level of ecosystem development but they are not there yet. These difficulties limit the applicability of the models to these regions and suggest the author is overly optimistic in attempts to apply the models in these contexts. Having said that, I have tried to argue throughout the thesis that I think the model can help regions like St. Anthony and Corner Brook. Additionally, I would say that the proposed model is significantly modified to bring in components from the literature on RIS/S3, less favoured regions and ecosystems but that the final product is not an ecosystem model per se but one that is adapted through learning from these different literatures.

A second and related limitation applies to the study's wider applicability through the choice of the two Newfoundland regions of the Northern Peninsula and Corner Brook. Whether other places can learn from these natural resource dependent rural and small city regions is an open question. However, these regions do share commonalities with other rural, peripheral and less favoured regions in Canada and elsewhere but the choices of these regions as case studies for this dissertation was based primarily on my professional and academic work therein over the past 20 years.

A third limitation is the choice of RIS and entrepreneurial ecosystems among a wider range of possible territorial innovation models (e.g., clusters, innovative milieus, industrial districts). RIS models have been around since at least the 1990s and have been widely written about, including some application to more rural and less favoured regions (Tödtling & Trippl, 2005; Foray et al., 2012). From this perspective it was a good choice for less favoured contexts. Entrepreneurial ecosystems models are newer, less developed in terms of critical analysis but acknowledged to be widely applicable across a range of contexts. Other models, such as economic clusters (Wolfe & Gertler, 2004), might have been considered but these presuppose agglomerations of economic activity that made them less relevant to the case study regions in Western Newfoundland.

There are several future research opportunities based on this dissertation. First, more work on the challenges of less favoured regions and whether the model can be realistically applied to these regions. Second, more emphasis on the empirical application of the proposed model in different less favoured regions. This could include mapping the regions and assessing the regions across key factors and then applying the stage of development process to support the evolution of the ecosystems. Third, the multi-case comparison of pre-ecosystem and nascent regions to elaborate the different elements of the model in more depth. Fourth, a longitudinal study of one region such as the Northern Peninsula, that tracks and supports moving from the pre-ecosystem stage to a mature ecosystem. Fifth, the comparison of different geographic contexts (e.g., Global North vs. South, coastal/inland, rural remote versus urban adjacent, or different economic base). Sixth, how monitoring and evaluation fits into the progression of regions through the model stages and studying how indicator frameworks help regions guide their progress (the S3 model includes monitoring and evaluation processes that could support

this). Seventh, the Corner Brook study noted a significant number of Indigenous participants and calls for further study of how the model is applicable to Indigenous contexts and Indigenous entrepreneurship and innovation. Eigth, the Corner Brook ecosystem mapping study was part of a broader Atlantic Canadian study across rural and urban regions (Farrell and Dennison, 2016), and there are opportunities to compare these regions further.

## 5. Personal Reflection

I have lived and worked in the Northern Peninsula and Corner Brook regions for close to 15 years. During my time in these regions, both as a researcher and an active participant in the regional innovation ecosystems themselves, the goal has been to find ways to support these places and this privileged positionality is acknowledged. Writing this dissertation took place over a long period while I worked fulltime in roles in the Provincial Government as a policy and research director, at Memorial University (Grenfell Campus) as a director of public engagement and research including having responsibility for the Navigate Entrepreneurship Centre in Corner Brook, and while I was involved in a new startup (a micro-distillery). The entrepreneurial activities are my second time as an entrepreneur having owned a restaurant in St. John's in the 1980s and 1990s. During these various roles I have lived equal periods in rural and urban parts of the province. I believe the sum of these experiences has given me a unique perspective on government, the university and entrepreneurship as well as how their roles interact. Perhaps the combination of these experiences has driven me to find ways for these interactions or to find models that encourage such collaboration.

Living in rural places makes one very aware of both the beauty of the landscapes, advantages of the rural lifestyle and the difficulties of sustaining livelihoods and finding new

economic opportunities in the face of economic change. While living in rural places struggling to survive, I have been cognizant of their strengths and assets and remain positive about new possibilities based on the people I have worked with and the plans and aspirations they have shared. The goal of this thesis has been to support the aspirations of the rural places studied herein and the people who choose to live there.

**References**


CBC (Canadian Broadcasting Corporation). (2017). "Fish skin for fashionistas: How this clever leather is hooking customers" CBC News, November 17. Online at https://www.cbc.ca/news/canada/newfoundland-labrador/eye-on-iceland-fish-skin-leather-1.4399985

Feld, B. (2012). *Startup communities: Building an entrepreneurial ecosystem in your city*. Hoboken NJ: John Wiley & Sons.

Farrell, E., & Dennison, N. (2016). *Quantitative analysis of the Atlantic entrepreneurial ecosystem's innovation activities*. Working Paper Series No. 2016-03. Halifax: Sobey School of Business.

Foray, D, Goddard, J, Xabier, G. B., Landabaso, M., McCann, P., Morgan, K., Nauwelaers, C. & Ortega-Argilés, R. (2012). Guide to Research and Innovation Strategies for Smart Specialisation (RIS 3). Luxembourg: European Union.

Government of NL. (2020). *Centre for Research and Innovation Celebrated by Partners*. Available at https://www.gov.nl.ca/releases/2020/exec/0727n01/

Government of NL. (2021). *Budget 2021: Change starts here*. Department of Finance. Available at https://www.gov.nl.ca/budget/2021/what-you-need-to-know/budget-highlights/

Greene, M. (2021). *The Big Reset: Report of the Premier's Economic Recovery Team*. May 2021. Available at https://thebigresetnl.ca/wp-content/uploads/2021/05/PERT-FullReport.pdf

Grenfell Campus. (2021). *Centre for Research and Innovation.* Available at https://www.grenfell.mun.ca/academics-and-research/Pages/centre-for-research-and-innovation.aspx

Grillitsch, M. & Sotarauta, M. (2020). Trinity of change agency, regional development paths and opportunity spaces. *Progress in Human Geography*, 44 (4), 704-723.

Hall, H.M, J. Walsh, K. Vodden, and R. Greenwood. 2014. Challenges, Opportunities and Strategies for Advancing Innovation in Newfoundland and Labrador. Final Report of the Advancing Innovation in Newfoundland and Labrador Project. St. John's: Memorial University of Newfoundland, Leslie Harris Centre of Regional Policy and Development.

Hall, H.M., Vodden, K, and Greenwood, R. 2017. "From Dysfunctional to Destitute: The Governance of Regional Economic Development in Newfoundland and Labrador." International Planning Studies, 22(2): 49-67.

Isenberg, D. (2010). How to start an entrepreneurial revolution. *Harvard Business Review*, 88(6): 40-50.

Motoyama, Y., & Knowlton, K. (2017). Examining the Connections within the Startup Ecosystem: A Case Study of St. Louis. *Entrepreneurship Research Journal*, 7(1). https://doi.org/10.1515/erj-2016-0011

Roundy, P.T., Bradshaw, M., Brockman, & B. (2018). The emergence of entrepreneurial ecosystems: A complex adaptive systems approach. *Journal of Business Research*, 86:1-10.

Saxenian, A. (1996). Inside-out: Regional networks and industrial adaptation in Silicon Valley and Route 128. *Cityscape: A Journal of Policy Development and Research*, 2(2), 41–60.

Schafer, S. & and Mayer, H. (2019). Entrepreneurial ecosystems: Founding figures and research frontiers in economic geography. *De Gruyter*, 63 (2-4):55-63.

Spigel, B. (2020). *Entrepreneurial Ecosystems: Theory, Practice and Futures*. Northampton, Massachusetts: Edward Elgar Publishing.

Tappeiner, G., Hauser, C., & Walde, J. (2008). Regional knowledge spillovers: Fact or artifact ? *Research Policy*, 37(5): 861–874.

Tödtling, F., & Trippl, M. (2005). One size fits all? Towards a differentiated regional innovation policy approach. *Research Policy, Elsevier*, *34*(8), 1203-1219.

Vodden, K., Douglas, D., Markey, S., Minnes, S., & Reimer, B. (2019). *The theory, practice and potential of regional development: The case of Canada*. New York: Routledge.

Walsh, J. & Winsor, B. (2019). "Socio-cultural barriers to developing a regional entrepreneurial ecosystem." *Journal of Enterprising Communities: People and places in the global economy, 13* (3), 263-282. https://doi.org/10.1108/JEC-11-2018-0088

Welter, F., Baker, T., Audretsch, D.B. & Gartner, W.B. (2016). Everyday Entrepreneurship - A Call for Entrepreneurship Research to Embrace Entrepreneurial Diversity. *Entrepreneurship Theory and Practice*, 41 (3), 311-321.

Wolfe, D. A., & Gertler, M. S. (2004). Clusters from the inside and out: Local dynamics and global linkages. *Urban Studies*, *41*, 1071-1093.

**Appendix 1: Research Ethics Clearances for Research Involving Human Participants**

**From:** smmercer@mun.ca <smmercer@mun.ca>
**Sent:** November 13, 2013 12:02 PM
**To:** Dr. Kelly Vodden (Principal Investigator) <kvodden@mun.ca>
**Cc:** ors@mun.ca <ors@mun.ca>; smmercer@mun.ca <smmercer@mun.ca>
**Subject:** ICEHR Clearance 2009/10-183-AR - EXTENDED

Interdisciplinary Committee on Ethics in Human Research (ICEHR)

Dear Dr. Vodden ,

Thank you for your response to our request for an annual status report advising that your project will continue without any changes that would affect ethical relations with human participants.

On behalf of the Chair of ICEHR, I wish to advise that the ethics clearance for this project has been extended to 2014/08/31. The *Tri-Council Policy Statement on Ethical Conduct for Research Involving Humans* (TCPS2) requires that you submit an annual status report to ICEHR on your project, should the research carry on beyond 2014/08/31. Also, to comply with the TCPS2, **please notify us upon completion of your project**.

| | |
|---|---|
| ICEHR Ref. No. | 2009/10-183-AR |
| Project Title: | *(2009/10-183-AR) Canadian Regional Development: a critique of theory, practice and potentials* |
| PI: | **Dr. Kelly Vodden**<br>**Faculty of Arts\Department of Geography** |
| Supervisor: | |
| Clearance expiry date: | Renewal Due-2014/08/31 |

We wish you well with the continuation of your research.

Sincerely,
*Susan Mercer*
*Secretary, ICEHR*

*ORS reference only - 40005000*

Please respond to the above items via your Researcher Portal account by uploading a 'Response Summary' and any revised supporting documents in the *Attachments* tab of your application. Please **highlight any revisions** to your supporting documents, and indicate 'revised' in the attachment description. Do not edit the text in the application tabs, as these changes cannot be tracked or highlighted. Explain any changes to the sections / tabs of the application in the Response Summary. You may download a Response Summary Template from the *Attachments* tab of your application.

**ICEHR No. 20162044-BA**

Dr. Blair Winsor
Faculty of Business Administration
Memorial University of Newfoundland

Dear Dr. Winsor:

Thank you for your submission to the Interdisciplinary Committee on Ethics in Human Research (ICEHR) entitled *"Entrepreneurial Ecosystems: mapping the extent, roles, and effects in St. John's and Corner Brook"* in which you are listed as the Principal Investigator.

The Committee has reviewed the well-written application and agrees that the proposed research is valuable, and of low risk to the participants. However, before the ICEHR can complete its review and certify that your project is in compliance with the guidelines of the *Tri-Council Policy Statement on Ethical Conduct for Research Involving Humans (TCPS2)*, the following issues need to be addressed.

1. The Committee considers that there may be limits to confidentiality, especially for those who are named as primary contacts in the survey responses. Similarly, please discuss whether there may be some reputational and/or perhaps competitive risks among the named firms and people. If so, the risks should be acknowledged in the consent document, and it should state that participants are free to skip any questions that they do not wish to answer. This statement should also be added to the survey instructions. As well, respondents should be given the option of returning the survey via an anonymous email or unspecified mailing address.

2. The gender question should include an option to self-identify for those who may be uncomfortable with the male / female binary.

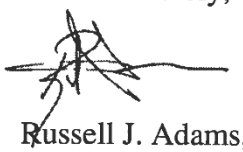
February 19, 2016



RA/th

The Committee will review and advise on your response as expeditiously as possible. Please be reminded that the *TCPS2* guidelines do not allow data to be collected from potential participants for the proposed research project until ethical clearance from the ICEHR has been provided.

Yours sincerely,



Russell J. Adams, Ph.D.
Chair, Interdisciplinary Committee on
Ethics in Human Research
Professor of Psychology and Pediatrics
Faculties of Science and Medicine