

**Major Research Paper (MRP)**

Canada's Innovation Policy's: An Analysis for Policy Learning and Change due to the COVID-19  
Pandemic

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Wednesday, July 14<sup>th</sup>, 2021

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## **1. Abstract**

Economies across the globe have been challenged and impacted with constant change such as climate change, increasing population diversity, migration flows and the significant impact of technology. In 2020, the economic shock of the COVID-19 pandemic has proven to be an intense challenge for economies, where its impact has caused some countries to either fall or adapt and thrive to new ways of doing business and innovating. The case of the Canadian economy currently demonstrates a more challenging recovery than other countries such as New Zealand, which saw a very brief recovery stage and is now moving on to their normal economic activities that were present prior to the pandemic. Economic shocks typically foster more change and adaptability to government approaches and policies. This paper explores if and how innovation policies in Canada are changing due to the COVID-19 pandemic, in comparison to Ontario's and New Zealand's innovation policies. To do so, this paper proposes a policy-learning analytical framework based on innovation policy intentions, innovation policy networks and innovation policy experimentation. Three aspects of innovation are analyzed: R&D, entrepreneurship and SME activity. The paper discusses Canada's policy learning and the economic barriers brought to light by the pandemic with the federal governments risk aversion, short-term policy approaches, lack of proactive innovation policy networks and experimental policy transparency. The paper proposes three recommendations for policy learning based on the discussed barriers: establishing a long-term innovation strategy with diverse policies that reflect the dynamic stages of innovation, fostering proactive collaborative innovation policy networks and creating transparent innovation policy experiments. All of these recommendations would be an initial step for Canada to begin establishing an innovation policy structure and economy built for opportunities for policy learning in a post-pandemic world.

## 2. Introduction

Economies across the globe have been challenged and impacted with constant change such as climate change, increasing population diversity, migration flows, the significant impact of technology and more recently, the COVID-19 pandemic. In 2020, the largest economic shock that has hit the globe in decades, the COVID-19 pandemic has proven to be an intense challenge for economies, where its impact has caused some countries to either fall or adapt and thrive to new ways of doing business and innovating (World Bank, 2020). With economies demonstrating intense vulnerability to the unprecedented shocks of the pandemic, Dr. Mark Ryan, the head of the World Health Organization (WHO) emergencies program warned, that if there is a lesson to take away from the pandemic, it is that “we need to get ready for something which may be more severe in the future” (Dangerfield, 2020). It is therefore important to understand if governments are learning from the challenges the pandemic has brought on to avoid repeating the same policy mistakes when a new shock to the economy strikes. Moreover, this paper uses a policy learning analytical framework to explore if and how innovation policies in Canada are changing due to the COVID-19 pandemic, in comparison to Ontario’s and New Zealand’s innovation policies. The scope of innovation policy referenced throughout this paper is focused on research and development (R&D), small-medium-sized enterprises (SMEs) and entrepreneurship as these are primary elements of innovation as well as limited space for discussing any other elements.

First, a rationale for the case selection for Canada, Ontario and New Zealand are provided in the context of innovation policy and the pandemic. Second, an explanation for the innovation policy scope of R&D, SMEs and entrepreneurship is discussed. A policy background for each case is then subsequently described to provide context for the analysis. Fourth, a policy learning analytical framework and methodology is developed based on the academic literature. The paper

then uses this policy learning framework to analyze each case for policy intentions, policy networks and policy experimentation. Finally, a discussion around Canada's policy learning from the pandemic and proposed recommendations are developed based on the analysis.

### *2.1 Why Canada, Ontario and New Zealand as Case Studies?*

Canada is a highly educated country, with a surplus of R&D that is respected internationally (Conference Board of Canada, 2018). Despite this, there is a gap between Canada's R&D efforts, productivity growth and commercialized innovations (The Conference Board of Canada, 2018). According to the Global Innovation Index (GII), Canada ranked 9<sup>th</sup> for Innovation inputs (R&D investment, talent pools etc.) and 22<sup>nd</sup> for Innovation outputs (business growth, knowledge creation etc.) in 2020, demonstrating a wide margin in effort and investment versus results (Global Innovation Index, 2020). This then puts Canada at a constant disadvantage as technology increasingly accelerates around the world. With the pandemic impacting Canada's economy, the country's real GDP had the biggest drop it has ever experienced in 2020, dropping 5.4 percent on the year (Statistics Canada, 2021). The federal government has recently put innovation at the forefront of the policy agenda in the last decade yet has not translated in the desired results. Therefore, the case of Canada is important for academia to explore policy learning as the economy continues to be challenged.

Ontario is seen as a national leader in innovation within Canada, with the highest investment in developing its innovation ecosystem compared to other provinces, a total of \$1.7 billion was invested from 2014 to 2017 in innovation (Ontario Ministry of Finance, 2018), not limited to investments in R&D, regional innovation centres, small business centres and supports for Ontario-based entrepreneurs. As the largest, most industrial and university-based R&D

activity across the country, Ontario is also ranked as the highest performing province for innovation in Canada according to the Conference Board of Canada (The Conference Board of Canada, 2018). It is also important to examine the provincial jurisdiction because provinces and territories have legislative responsibility in most areas that innovation impacts such as small business development by regulating domestic trade, talent, and the financial market (The Constitution Act, 1982).

The country of New Zealand has proven to be a model case when it comes to pandemic recovery, with the World Health Organization praising its quick efforts to keep COVID cases low (World Health Organization, 2020). The case of New Zealand's innovation landscape is also similar and different to that of Canada's in a variety of ways. Yet, both its similarities and differences are what make it an effective comparative case study to Canada and Ontario. Similarly, New Zealand has a strong industrial structure on agriculture, fishing, its manufacturing sector and a large part of its output focused on low and medium level technology sectors such as wood, dairy, textiles etc. (Smith, 2006). It also has a similar political structure in place with both systems based on a Westminster system, with New Zealand remaining a constitutional monarchy with the Queen of England as the sovereign (Boyce, 2013). In contrast, New Zealand's innovation policy features low levels of R&D investment when compared to other OECD countries such as Canada (OECD, 2020). Instead, New Zealand has shifted its approach to innovation policy from R&D to a more business facing, digitized and commercialization concentrated one (New Zealand's Research, Science, & Innovation Strategy, 2019). Finally, New Zealand's notable successful pandemic management has mitigated the economic impacts of COVID-19. New Zealand's implemented a set of non-pharmaceutical interventions with the goal of a COVID-19 rate of zero and nothing more (Robert, 2020). In less

than a month, the daily number of COVID-19 cases dropped below 10, a circumstance Canada or Ontario have yet to experience over a year later (Robert, 2020).

## *2.2 Why Focus on R&D, Entrepreneurship & SMEs in Innovation?*

The scope of innovation can be wide and overwhelming if not appropriately defined within the context it is being used. R&D, entrepreneurship and SMEs are selected elements of innovation referenced throughout this paper because they all play a critical role in productivity and long-term innovation growth. R&D informs the creation of new ideas that are reliably and purposefully developed through careful investigation and the production of evidence. It is also through R&D that people enhance their knowledge and skills, inevitably becoming experts at problem solving to better advance the margins in innovation, between what we currently know and what we are capable of creating (Council of Canadian Academies, 2018). SMEs are typically less innovative than larger enterprises, however, SMEs made up 98% of businesses in Canada in 2019 in which there is an opportunity for innovation policies to have a larger impact on a larger business population (Key Small Business Statistics, 2020). The definition of entrepreneurship has been debated for a few decades in the literature. In a book by Dollinger in 2008, entrepreneurship is defined as “the control and deployment of resources to create an innovative economic organization (or network of organizations) for the purpose of gain or growth under conditions of risk and uncertainty.” (Dollinger, p. 9, 2008). Using this definition for entrepreneurship and to create an innovative economic organization, it is clear that at the core of SMEs are entrepreneurs who start the business for the purpose of gain or growth. Therefore, SMEs and entrepreneurship will be used interchangeably throughout this paper.

### **3. Innovation Policy Landscape Before the Pandemic**

To better understand the analysis of this paper, some of the historical developments of innovation policy in Canada, the province of Ontario and New Zealand before the pandemic must be outlined to put the analysis into context. This contextual background highlights the main features of each cases innovation landscape and the major developments that contributed to it overtime prior to the pandemic. Since the historical development literature varies, only the main government policies and programs and the associated developments of the 3 main areas of innovation introduced in the previous section are examined: the state of R&D, SMEs, and entrepreneurship.

#### *3.1 The Canadian Innovation Landscape*

In the 1980's Canada engaged in a decentralized approach to innovation policy, focusing heavily on entrepreneurship and market competition, introducing Canada's first 'National Science and Technology Policy' in 1987 and then the Networks of Centers of Excellence Program (1988) focusing on industry partnerships, commercial exploitation to funding academic research and promoting market-oriented research (Higham et al., 2016; found in Tamtik, 2016). Overtime, milestone innovation policies initiated in the late 1990's, such as the Canada Foundation for Innovation (1997) and Genome Canada. Since then, the federal government had taken a hands-off approach to innovation policy intervention by reducing political control and primarily focusing its efforts on funding research councils and other organizations to regulate (Tamtik 2016). Subsequently, several updated innovation strategies emerged from the federal government since 2007 that demonstrated a national vision for more policy coordination amongst innovation stakeholders such as industry leaders, SMEs etc. This 'federal voice' for innovation

unfortunately was limited when translating into tangible actions. A cause for this is Canada's federal system and its lack of legal responsibility in influencing provincial policies. Putting Canada in a difficult position, as there is only one voice dedicated to innovation, the Ministry of Science, Innovation and Economic Development (ISED) within a Cabinet that has ranged between 35 to 40 ministers. The political structure lacks consistency, as the name and the innovation portfolio has moved around from ministry to ministry impacting institutional memory (Tamtik 2016).

The Conference Board of Canada (2018) ranked Canada 12<sup>th</sup> of 16 countries, including Australia and the United States. Although, this is one ranking higher than it was in 2013, other countries proved to have a stronger performance and has kept Canada boxed in its double-digit position despite its R&D investments. Yet, business expenditure on R&D, measured as a percentage of GDP, has significantly decreased in the last decade, with an average decline of 2.6% a year and placing last among 16 peer countries (Higham, 2016; also found in Conference Board of Canada, 2018). When looking at the players in the innovation landscape, SMEs (1 to 499 employees) make up a substantial part of the Canadian economy, accounting for 57.7% of the business sector employment in 2015 (OECD, 2017), therefore a large contributor to labour productivity. Canadian SMEs are also very active in R&D efforts, accounting for 35% of total business R&D in 2013, which was on par with the OECD average at the time (OECD, 2017). In terms of innovation activity, SMEs have a strong performance as they compare with those of large firms with 68% involvement.

In 2017, the OECD reported that the federal government operated about 250 business support programs. To navigate such a large set of programs, the National Research Council (NRC) provides a Concierge Service for SMEs to find external advice on innovation and

government programs (OECD 2017). One of the largest government programs supporting business R&D in Canada is the Scientific Research and Experiment Development Tax Incentive (SR&ED). This decades-old program is specifically focused on supporting business R&D expenditures by using tax incentives that can be utilized in three ways: an income tax reduction, an investment tax credit or in some cases a refund (Canada Revenue Agency, 2021). This is the most utilized innovation program across Canada, providing \$3 billion in tax incentives annually, half of which went to SMEs in 2015 (OECD 2017).

There are several other direct SME innovation programs offered by the government, however total expenditure is not comparable to the SR&ED tax credit. Programs such as the NRC's Industrial Research Assistance Program (IRAP) have funded over 2,500 SMEs and provided advisory services to over 10,000 SMEs (OECD 2017). The 2017 federal budget devoted a section to innovation policy entitled "Building a Nation of Innovators" (Canadian Federal Budget, 2017). This was a refreshing new focus on the actors that actually innovation and a change in scope for public innovation policy. Then, in 2018, the federal budget announced the consolidation of the longest running direct support program, the Network of Centres of Excellence (1988), and the more recent Centres of Excellence for Commercialization and Research (2007) into the Strategic Innovation Fund (SIF) (Canadian Federal Budget, 2018). The Centres for Excellence for Commercialization Research program matched clusters of research experts with the business community to better promote commercialization of innovative technologies, products and services (Higham 2016). The new SIF program essentially supports large scale transformation as it matches funding for innovation projects within two streams: business innovation and growth and, collaborations and networks (Ministry of Innovation, Science and Economic Development Canada (ISED), 2021). The funding can be used by

businesses for R&D, acquiring investments, and scaling. The program states its goal as, “...supporting the Canadian innovation ecosystem.” (ISED, 2021)”. A vague and untargeted goal, the program requests a minimum of \$10 million in initial funds from the business for the government to match 50%. Looking at ISED’s current 37 innovation programs, little to none are non-R&D based and intended for projects focused on productivity and employment growth. Innovate Solutions Canada is another R&D program for testing prototypes; however, the catch is that the federal government does a callout for specific types of innovations to incentivize entrepreneurs to collaborate with the public sector (ISED, 2021). The government of Canada did not begin to invest in programming that specifically enabled entrepreneurship until 2001. However, it was only through third party programming, contributing over \$103.5 million to not-for-profits like Futurpreneur, providing loans and mentorship to over 8,600 young entrepreneurs and launching 7,200 new business across Canada (Futurpreneur Canada, 2020). The Government of Canada then released its milestone 2017 Innovation and Skills Plan that demonstrated a 5-year plan on innovation investment and policies.

### *3.2 The Ontario Innovation Landscape*

The development of innovation policy started in 1997 when it first entered the Ontario government political agenda (Tamtik 2016). However, the first real signal by the province indicating innovation as a critical component of the economy was in 2005, when Ontario announced its first coherent innovation strategy with the establishment of the Ontario Ministry of Research and Innovation (MRI) (Tamtik 2016). The Ontario Innovation Agenda was then introduced in 2015, which was heavily focused on the development of high-quality talent and strengthening the provinces innovation-based economy (Ministry of Economic Development,

Job Creation and Trade (MEDJCT), 2015). However, unfortunately, the Ontario government's strong public and financial support for innovation and academic-based R&D did not translate into accelerated private investment and commercialization (Council of Canadian Academies, 2013; also found in Tamtik 2016). Compared to other provinces in Canada however, Ontario proves to be a national leader in innovation. From 2014 to 2017, the provincial government invested close to \$1.7 billion to enhance the development of the innovation ecosystem in Ontario. This included investments in research institutes such as academic and NGO institutions, regional innovation centres, as well as supports for SMEs and entrepreneurs (Ontario Budget, 2018). Similar to Canada's SR&ED program, the province has the Ontario Research Development Tax Credit (ORDTC) which was introduced in 2008 and administered by the Canada Revenue Agency. It is a 3.5% non-refundable tax-credit on eligible R&D expenditure. Ontario also has the Ontario Business-Research Institute Tax Credit and the Ontario Innovation Tax credit which were all also introduced in 2008 as non-refundable tax credit programs focused on innovation (Canada Revenue Agency, 2021).

### *3.3 The New Zealand Innovation Landscape*

This history of New Zealand's innovation policy development starts with science policy, as 'science' being a term used synonymous to innovation for the New Zealand government at that time (Leitch et al., 2013). In 1997, two new government agencies with a strong emphasis on enhancing quality of research was introduced in the New Zealand government, the Ministry of Research, Science and Technology (MRST) tasked with providing policy advice to the government, and the Foundation for Research, Science and Technology (FRST) tasked with managing funding (Leitch et al., 2013). In 2011, MRST and FRST disbanded and the creation of

a single lead agency, the Ministry of Science and Innovation (MSI) developed. This marked the government's first use of the concept of 'innovation' in its discourse and structural processes in policy (Leitch et al., 2013). Shortly after, a new 'super-ministry' was announced in 2012 titled, the Ministry of Business, Innovation and Employment (MBIE). What makes this a 'super ministry' is that it absorbed both the MSI and the Ministry of Economic Development, the Department of Labour and the Department of Building and Housing with the goal of creating a single business-oriented organization that drives the business growth agenda (Key 2012; found in Leitch et al., 2013). Refer to Appendix A where you can see the structural changes of New Zealand's science policy as it transitions to innovation policy (Leitch et al., 2013). The subsequent milestone for New Zealand's innovation policy developments was the *Business Growth Agenda: Towards 2025* report published in 2015 that explicitly outlines fostering innovation as a priority by "Developing New Zealand as a hub for high-value, knowledge-intensive businesses conducting more R&D" (The Business Growth Agenda: Towards 2025 Report, p. 6, 2015). Finally, the latest report by the New Zealand government was the *Research, Science and Innovation Strategy* published in 2019, outlining the country's key challenges and a set of solutions structured in an innovation action plan (MBIE, 2019). The report includes evidence on the country's economic output and a transparent long-term strategy for innovation.

#### *7.4 Progress in Pandemic Management*

Despite all cases being in the economic recovery phase, New Zealand has had great success attributed to its "hard and early" response to the pandemic (Schmidt, 2021). New Zealand's current Minister of Finance, Grant Robertson, attributed their hard and early response to completely mitigating the harmful effects of the pandemic on the economy and bringing case

numbers to a virtual standstill before the end of 2020 (Schmidt, 2021). This led authorities to begin relaxing social-distancing measures much earlier than other countries such as Canada, where New Zealand experienced a resurgence in economic activity during the latter half of 2020 (Schmidt, 2021). Therefore, the Global Innovation Index (GII) ranking for New Zealand in Table 1 below, is most likely subject to do better this year.

**Table 1.** Global Innovation Index – Overall Innovation Ranking

Country/Year	2017	2018	2019	2020 Pandemic Year	Change Status
Canada	18th	18th	17 <sup>th</sup>	18th	No
New Zealand	21st	22nd	25th	21st	No

(Global Innovation Index, 2020)

It is important to note that in Table 1, that the GII ranking for overall innovation, which includes criteria such as R&D, education, business environment, investment, trade etc. shows a revert back to 2017 rankings during the 2020 pandemic for both countries. The question is how they will change post-pandemic.

#### **4. Analytical Framework**

Innovation systems are very context specific, as they are shaped by regional economic needs and political demands. Therefore, it is important to understand how innovation systems evolve and more specifically, demonstrate non-linear changes of policy focus. These non-linear changes occur due to the modern nature of innovation and the age of technology the economy has become susceptible to, such as changes to the definition of the innovation policy problem due to the accelerated rate of technology growth. This section reviews the conceptual foundations of innovation and innovation policy. The following sections then identifies an analytical framework

concentrated on policy learning for this paper, that is informed by government intentions, the policy network approach and experimental innovation policy approach.

#### *4.1 What is Innovation and Innovation policy?*

Although the definition of innovation is broad and subjective based on the context it is used, when the scope its use is narrowed to the policy sphere, innovation, by definition is simply about, “understanding that something can or needs to be done differently than how it is done now” (Schwanen, p. 11, 2017). A practical definition from the OECD’s most up to date Oslo Manual (2018) on innovation describes it as, “a new or improved product or process (or combination thereof) that differs significantly from the unit’s previous products or processes and that has been made available to potential users (product) or brought into use by the unit (process)” (OECD, p. 20, 2018). The term “unit” here is synonymous to describe any actor that plays a role in innovation. This can include individuals (entrepreneurs), small or large businesses, academic institutions, venture capitalists, governments, not-for-profit organizations, etc. All of these actors play a significant role in the innovation policy ecosystem in facilitating high productivity, economic growth, job creation and can provide more resources available to support education, health and infrastructure. In sum, an innovation is a product (or service), or way of doing things that is superior to what existed before and is therefore adopted.

The majority of the innovation policy literature pays less attention to the policy process and how it unfolds or changes overtime than on rational policy choices, such as having effective R&D subsidies or public venture capitalist funds in reaction to market or system failures. Additionally, the goal of innovation policy varies in the literature based on political agendas, economic climate, and public opinion at the time. However, this paper primarily explores the more recent literature of Canadian scholars and reports on innovation and innovation policy, as

discussions immediately relate to the Canadian context. Rather than debating on the value of one definition over another, it is more important to simply inquire on the brief evolution of the definitions of innovation and innovation policy and the way they have been framed as they adapt to expectations and changing socio-economic developments.

After the Second World War, innovation policy was framed as a tool for growth, tapping into the potential of science and technology for economic prosperity by directing efforts towards mass production and consumption (Schot & Steinmueller, 2018). In the 1980s, national systems of innovations were deemed necessary to address the consequences of the intensification of international competition, globalization, and the promise of keeping up with prosperous nations (Schot & Steinmueller 2018). Yet, the discussion on innovation policy was focused R&D efforts and infrastructure, financial support for businesses and technology transfer. Innovation policy developed originally from science policy and industrial and competition policy. However, innovation policy focuses on the role of industrial restoration and growth, especially through new market demands and technologies (McKelvey & Saemundsson, 2018). There is some recent dialogue on the directionality of policy intervention and regional demands of innovation policy for the creation of high-tech, knowledge-based industry clusters, and the attraction of global companies rather than its government inputs (i.e., programs) (Tödtling & Trippel, 2005). This transition from government inputs towards policy directionality and the role of the demand side emphasizes how policy capacity and resources have pivoted towards a more strategic approach to policy in the innovation arena.

#### *4.2 Innovation Policy Theories*

After review, the innovation policy literature proves to present a variety of theories that range from economic, political, social or business oriented. A few of the important and most debated theories are examined in this sub-section to provide context and guide the discussion to the selected theories that will provide the foundation for the analytical framework.

First, the concept of disruptive innovation in the economy, introduced by Christensen in 1997 has become more relevant as new technologies are discovered (i.e., Tesla's self-driving car). A disruptive innovation is something, "that changes the fundamental technologies of an industry" (Christensen, 1997). A more common branch of Christensen's disruptive innovation is incremental innovations, which is improvements in products (or services) and processes that create competitive advantages without disrupting an industry (Christensen 1997). Incremental innovations are just as important, as it can benefit businesses and the economy without necessarily being at the forefront where disruptive innovation tends to be. In contrast, innovation policy is also not exclusive to the economic perspective. There is a more holistic approach: the policy areas discussed are primarily meant to have a significant impact on innovation, but not necessarily spur innovation directly. What this means is that an innovation policy's goal is meant to help facilitate an ecosystem that enables and motivates individuals to act without directionality from the government (Schwanen 2017). In sum, innovation policy simply should just focus on expanding innovation capacity without direct intervention.

#### *4.3 What Theories will be Used in the Analytical Framework?*

A wide set of innovation policy theories exist in the literature. Yet, this paper will focus on only three theories and the sub-theories that support them. This section will preface the policy learning analytical framework with its theoretical context. Therefore, a brief review is outlined of

the intentions approach to innovation policy, the innovation policy network approach and experimental innovation policy.

#### *4.31 The Intentions approach to Innovation Policy*

Innovation policies are also backed by government intentions, which are expressed objectives in support of regulations to the public (McKelvey and Saemundson, 2018). What this means in the for this paper, is that any type of government rule that enables or supports its constituents to innovate has an intention, whether the intent be commercialization or growing the knowledge-based sector through R&D etc. These government rules can range from guidelines, policies, laws, statutes, regulations or orders and are supported by governance mechanisms put in place to coordinate innovative activities for meeting goals and regulate unwanted consequences (McKelvey & Saemundsson, 2018). Within this approach are three key elements: policy alternative, policy field and policy organization (McKelvey & Saemundsson, 2018). A policy alternative is defined as a “set of ideas and beliefs about action, which include the performance of a series of interdependent tasks by a number of actors” (McKelvey & Saemundsson, p. 855, 2018). Whereas a policy field is a higher-level construct that includes a set of policy alternatives that have an aim to solve policy problems (i.e., innovation, commercialization, etc.). They argue that the original policy field intent of innovation policy makers was on commercialization of science and technological knowledge made possible through mutual learning and adaptation, whereas what is considered economically valuable knowledge and the types of actors involved in the policy process has now broadened in scope. Finally, policy organization is a concept of a space that enables an opportunity for suggestions, discussions, selection and implementation of policy alternatives. Saemundsson 2018). Moreover, McKelvey and Saemundson’s intentions

approach is relevant to policy learning because government intentions should be dynamic and context specific and not remain status quo throughout institutional, social or political changes.

#### 4.32 The Innovation Policy Network Approach

Recent reports have been associating the lack of a policy network and coordination between public and private sector actors, with Canada's continuous under-performance in innovation policy (Rowe et al., 2019). Yet, coordination across public and private policy actors provides an opportunity to streamline mutual goals and objectives. Policy coordination is defined in the literature as, "a process that facilitates a comprehensive, 'whole government' perspective instead of narrow sectorial views, avoids overlap and inconsistencies in policy directions, and secures a coherent order of priorities to minimize stakeholder conflict" (Tamtik, p. 418, 2016). Tamtik (2016) argues that the policy network approach "focuses on the influence and the relationships between actors involved in a policy area (e.g., innovation). Policy networks are formed by the actors who have an interest in the policy area, share a common policy focus, and can shape policy outcomes" (Tamtik, p. 418, 2016). Tamtik's (2016) recent Canadian case study on Ontario demonstrated that there is a need for policy coordination as government innovation policy coordination between the federal and provincial level lacks formality and consistency resulting in a fragmented flow of information or duplication of programs. Findings also proved that ad hoc activity and a lack of organizational structure was a concern and a barrier for innovation policy from both federal and provincial governments. Therefore, to evaluate these policies, Tamtik framed the policy network approach around three main ideas: coordination models, policy networks, and policy learning (Tamtik, 2016). However, due to limited space, this paper will only focus on the latter two.

Although Tamtik's study analyzed the policy network within the public sector in addition to externally, the study notably features Lundvall's (2009) systems approach to innovation within the policy network as it is based on learning from all interested actors, stating that "a system of innovation is a social arrangement constituted by elements and relationships, which interact in the production and diffusion of new economically useful knowledge" (Lundvall 2009; found in Tamtik 2016). A separate, but similar innovation policy theory focused on the relationship between public and private actors and accumulation of economically useful knowledge, the triple-helix model emphasizes that, "an emerging knowledge-based society is created through universities, firms and governments interacting and taking the role of the other." (Etzkowitz & Zhou, p. 23, 2017). This model characterizes an innovative ecosystem as a knowledge-based society where universities and government organizations can also be entrepreneurs in collaboration with individuals and firms. In addition to this, the three spheres (universities, government organizations and individuals/firms) interact and take the role of the other to develop initiatives through horizontal, bottom-up and top-down coordination (Etzkowitz & Zhou, 2017).

In earlier literature, a type of policy coordination approach discussed in the context of innovation is the regional innovation system (RIS) approach (Tödting & Trippel, 2005). RIS provides a useful framework focusing on firms, clusters, and institutions of an innovation system, to the interdependencies within the region and to higher spatial levels. This approach looks at the interdependencies of policy actors at a regional scale, making it more likely to succeed in practice than on a federal scale, due to the smaller quantity of actors that require coordination within a small region. The RIS is similar to policy network approach however, the

difference is that it focuses on regional-level innovation needs and interdependencies and does not analyze the vertical relationship and network between governments.

Consensus of priorities and lack of conflict are also very important for the success of innovation policy. Padure and Jones (2009) argue that “policy networks provide a useful mechanism for assessing conflicts and the various interests of policy actors involved in a policy field” (Padure & Jones, 2009; found in Tamtik, p. 418, 2016). Effective government coordination is therefore a proactive method for mitigating conflict between actors, creating harmonization. With innovation being unpredictable, engaging in continuous coordinated communication lowers the likelihood of policy duplication, conflicting priorities and missed feedback on policy outcomes. In sum, coordination within a network of actors that have an interest in innovation and the policies that regulate it, is linked to policy learning because coordination among policy actors allows them to gather expertise, reflect and shape policy beliefs through what they learn from each other and the policy practices that work (Tamtik, 2016). As this process of gathering, reflecting and learning continues, the flow of expertise and good policy practices accumulates, which then begins to inform and shape better policy decisions for the future.

#### 4.33 Experimental Innovation Policy

Why is innovation policy not modeling the culture of innovation, which heavily involves experimentation? According to Bravo-Biosca (2020), the main objective of innovation policy is to, “support experimentation with new technologies, products, processes, or business models, and accelerate their diffusion throughout the economy and society. Yet, paradoxically, innovation policy itself does not conduct enough experimentation (Bravo-Biosca, 2020). The concept of experimenting can be used in a variety of contexts; the Cambridge English Dictionary

defines it as, “a test done in order to learn something or to discover if something works or is true” (Cambridge Dictionary, 2021). The most important characteristic that is captured in this definition is in fact: learning. The experimental policy intention, the structure, and evidence should specifically be about strategic policy learning. An example of experimental policy would be to explore and test a wide range of ideas at a small scale such as through policy pilots in order to learn which policies would work effectively and then scale them up. To clarify, an experimental policy pilot has systems in place that require learning from the pilot such as checkpoints, which are a set date at which the results are assessed and a decision is made to continue, improve or stop the pilot (Bravo-Biosca, 2020). By doing this, policymakers can better understand and generate insights on how different types of innovation methods inform program and policy designs (Bravo-Biosca, 2020).

A critical aspect of policy experimentation is also to practice both proactive and reactive learning to societal challenges. Challenges have historically dictated innovation policies since challenges typically highlight gaps and therefore opportunities for innovation, which is when something can or needs to be done differently than how it is done now (Schwanen, 2017). Nelson and Winter (1982) emphasized that the “design of a good policy is, to a considerable extent, the design of an organizational structure capable of learning and of adjusting behaviour in response to what is learned (Nelson & Winter, 1982; found in McKelvey & Saemundsson, p. 852, 2018).

There are some challenges to practicing experimental policy in the innovation arena. First, the innovation ecosystem is complex and non-linear, meaning there is no identified structured pathway to success for innovation, making it difficult to keep track of. Second, innovation systems are continually evolving at an accelerated rate, making it a challenge to be proactive to the trends reshaping innovation systems, such as digitization or increased market

concentration. Innovation is also new and unpredictable and lacks evidence that would help guide policy decisions (Bravo-Biosca, 2020). Cultivating a culture of experimentation across economies and innovation actors takes time, especially because most policy actors in Canada are risk adverse (Bravo-Biosca, 2020). The reason this paper emphasizes experimental policy as an effective and relevant approach to innovation is because innovation is about testing out new ideas at its core which therefore informs policy learning and accrues expertise. Evaluative mechanisms need to be put in place from the get-go for policy experiments in order for informed policy learning can be utilized to continuously implement a better policy.

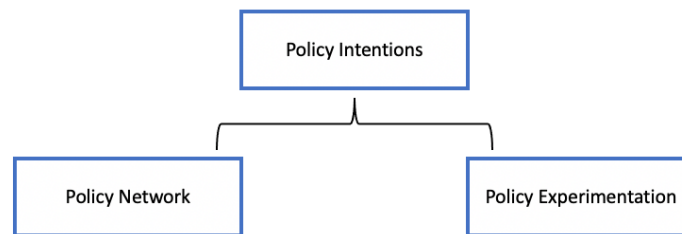
#### *4.4 An Analytical Framework for Innovation Policy Learning*

This paper proposes the combination of the innovation intent, policy network and policy experimentation theories to inform an analytical framework that best evaluates the changing of Canada's innovation policies. This analytical model leverages the common theme of these theories: policy learning. While this paper investigates whether Canada's innovation policies have changed due to the COVID-19 pandemic and the reasons for those changes or lack thereof, policy learning is the measure of successful innovation for the analysis. Policy learning is an effective measure for analysis due to the current timing of this study. The outcomes of policies implemented today will not be experienced until later, which means the outcomes do not exist yet and therefore cannot be analyzed. Analyzing the changing intentions, policy network approaches and policy experimentation of the different governments is also an effective way to explore successful innovation policy because it evaluates a government's overall levels of adaptation and awareness of the innovation ecosystem and during a time that the economy's resilience is tested. There are three parts and proposed questions that guide the analytical

framework based on the aforementioned theories. It is important to note that policy intentions are the largest analytical concept of this framework to be explored as it encompasses objectives that include policy networking or collaboration and experimentation.

First is the largest assessment, analyzing government intentions on innovation policy (McKelvey and Saemundson, 2018) and asking if government intentions that support innovation policies are changing due to the COVID-19 pandemic (i.e., commercialization, R&D, foreign direct investment, job creation, etc.). The intentions analysis should provide context and preface the subsequent policy network and experimentation analysis as illustrated in Figure 1 below.

**Figure 1.** Innovation Policy Learning Framework



Second, the analysis reviews the cases for policy network engagement (Tamtik, 2016) and asks whether innovation policies are engaging or incorporating in policy networks external of the public sector.

Finally, assessing innovation policy experimentation (Bravo-Biosca, 2020), by asking whether innovation policies are incorporating an experimentation component such as expanding a pilot based on its evaluated success overtime. These guiding questions within the analytical framework come together to help answer whether or not policy learning is occurring overtime and if so, if the COVID-19 pandemic is the cause and how that may impact future innovation policy approaches.

## 5. Analysis

This section takes the theoretical concepts of policy intentions, policy networks and policy experimentation outlined in the analytical framework and provides a policy learning lens to innovation policy changes overtime. It is important that the policies are demonstrating not only change but change as a result of learning. Breaking down the different approaches by each case study will demonstrate how each country and province not only propose to act on, but how they optimize policy learning through other means, such as collaboration with stakeholders, constituents and testing out new ideas.

### *5.1 Methodology*

This paper conducts a content analysis on the different innovation policies in Canada, Ontario and New Zealand since 2017 to current policies up until 2021 that either have survived or evolved during the COVID-19 pandemic. The analysis begins in 2017 as this was the year that the Canadian federal government launched the Innovation and Skills Plan (2017), which signaled an ambitious effort to make Canada a world leader in innovation (Canadian Federal Budget, 2017). The analysis strictly focuses on policies and programs implemented by the governments and their partnerships and policy evaluation reports, not programs or initiatives lead by the private sector with the goal of stimulating innovation.

First, in order to assess policy intentions consistently across all cases, a content analysis of the Canadian federal budgets, the Ontario provincial budgets and New Zealand's annual fiscal reports released between 2017 and 2021 budgets is performed to identify the intended core objectives behind various innovation policies. In addition, specific innovation initiatives are examined: Canada's 2017 Innovation and Skills Plan and New Zealand's 2019 Research,

Science, and Innovation Strategy. No new significant initiatives since 2017 have come into fruition for Ontario since the 2015 Innovation Agenda. This is done by identifying themes relevant to innovation in government policies, more specifically focusing on one of the key elements of this approach: policy fields, which is a construct that includes a set of policy alternatives that aim to solve policy problems (McKelvey and Saemundson 2018). This typically takes form as explicitly consistent and repeated objectives to solve the same policy problem in the policies rationale (McKelvey and Saemundson 2018).

Second, when analyzing policy networks, each case's milestone strategies and network initiatives is examined: Canada's 2017 Innovation and Skills Plan; New Zealand's 2015 Business Growth Agenda and 2019 Research, Science and Innovation Strategy; and the legacy of the Ontario Entrepreneurship Network (ONE).

Finally, each government's annual budgets and available assessment reports are analyzed to determine if the gaps identified in the 2017 policies as well as those brought forward by the COVID-19 pandemic are being addressed in the policies proposed in the 2021 annual budgets indicating efforts for policy experimentation. The objective here is to determine if there is policy learning.

### *5.2 Government Intentions for Innovation Policy*

In the case of Canada, Ontario and New Zealand, it is important to analyze government intentions before and during the COVID-19 pandemic to determine if policy learning is occurring and adapting to the policy problems of innovation (McKelvey and Saemundson, 2018). The question this sub-analysis attempts to answer is whether government intentions that support innovation policies are changing due to the COVID-19 pandemic. Within this sub-analysis, the

three selected elements of innovation discussed in the beginning of this paper are examined for change: R&D, entrepreneurship and SMEs. Due to the lack of consistency and the tendency by governments to see entrepreneurship and SME as synonymous, policies supporting one or the other will be analyzed together. After a rigorous analysis of the content on the evolution of intentions for innovation policy outlined in the budgets of each case, the findings demonstrate some change for all cases; however, when ranking from most to least change, the analysis found New Zealand to be last with the least amount of change due to the pandemic, Ontario second, and Canada first with the most change.

#### 5.21 R&D as an Intention

This paper recognizes that Canada and Ontario, compared with New Zealand, have opposite strategies for R&D investment, with Canadian investment being historically higher and indirect while New Zealand historically lower. R&D efforts by Ontario are examined alongside Canada as the province takes on a secondary role to innovation due to the primary funding and priorities lead by the federal government. Overall, this sub-section continuously looks at R&D as an intention for enabling and supporting innovation to examine change in R&D in response to the pandemic.

The Government of Canada prides itself on establishing Canada as a world leader when it comes to investing in research, especially in post-secondary institutions, as Canada ranked first among G7 nations and eighth among Organisation for Economic Co-operation and Development nations for R&D in 2017 (Council of Canadian Academies, 2018). The scientific research and experimental development (SR&ED) tax credit is one of the country's oldest innovation policies, dating back to 1986 (Canada Revenue Agency, 2015). However, no new changes have been

made to the SR&ED program since 2013, in which most of the recent changes then and just before that were mainly of a limiting nature for Canadian SMEs and entrepreneurs such as a \$1000 penalty for a missing, incomplete or inaccurate tax claim (Canada, 2020). The 2017 Innovation and Skills Plan presented no new R&D efforts. Simply, increased funding to the National Research Council, who administers the Industrial Research Assistance Program and other industry focused initiatives such as R&D in stem cells, space, quantum information and social innovation (Innovation & Skills Plan, 2017). In 2018, the Government of Canada pledged to continue to reinforce world class research at post-secondary institutions in areas such as quantum computing, stem cells and artificial intelligence (AI) (Canadian Federal Budget, 2018).

After the pandemic hit, however, the 2021 federal budget changed priorities. Rather than post-secondary institutions being the main hub for government R&D investment, it proposed \$2.2 billion in supporting R&D and talent in the life-sciences and health sector due to the setbacks brought upon by the pandemic (Canadian Federal Budget, 2021). This includes the launch of the National Quantum Strategy, an emerging field transforming how life-saving drugs are developed or designed and the Pan-Canadian Genomics Strategy, which supports research in developing therapeutics and helping Canada track and fight COVID-19 (Canadian Federal Budget, 2021).

*“Growing Canada’s life sciences and bio-manufacturing sector is a priority that goes beyond responding to COVID-19. This is a growing sector that supports thousands of good, middle class jobs.” - 2021 Canadian Federal Budget, p. 72*

In parallel to this new R&D investment in the health sector, Canada did not introduce any other significant policies but expanded funding for existing signature programs in 2021 such as the Strategic Innovation Fund for large corporation R&D and the Industrial Research Assistance program, which provides expert advice and funding for SMEs to increase R&D with the goal of

commercializing (Canadian Federal Budget, 2021). This shows that the R&D intention for businesses such as SMEs and entrepreneurs by the federal government was to simply increase funding during the pandemic. By prioritizing innovation R&D in the life-sciences and bio-manufacturing sector, this change presents itself as a more concentrated effort to the ‘sciences’, where knowledge-transfer and commercialization are no longer at the forefront of the federal government’s agenda for innovation R&D during the pandemic. What does remain the same prior to the pandemic and now during is the objective of the intention: supporting middle class jobs and job creation.

Ontario took on a similar path from post-secondary education R&D, which is a part of the provincial jurisdiction, towards R&D in the health sector. For instance, it invested in establishing the Beta Research and Innovation Cluster at Trent University and in renovating the Centre for Advanced Research and Innovation in Biotechnology (Ontario Budget, 2017). Then, in 2018, through the new \$935 million invested Good Jobs and Growth Plan, Ontario enhanced the Ontario Research and Development Tax Credit that was started in 2008, by increasing the percentage rate to enhance business competitiveness (Ontario Budget, 2019). 2019 presented an opportunity to invest in R&D in Ontario’s agri-food sector, as it plays a major role in the provincial economy with a high density of jobs. The Ontario government also proceeded to emphasize the outcomes:

*“...employing more than 800,000 workers. Investments in agri-food research result in new products and services for the global marketplace, helping to ensure that the industry remains competitive and creates jobs for the people of Ontario.”*

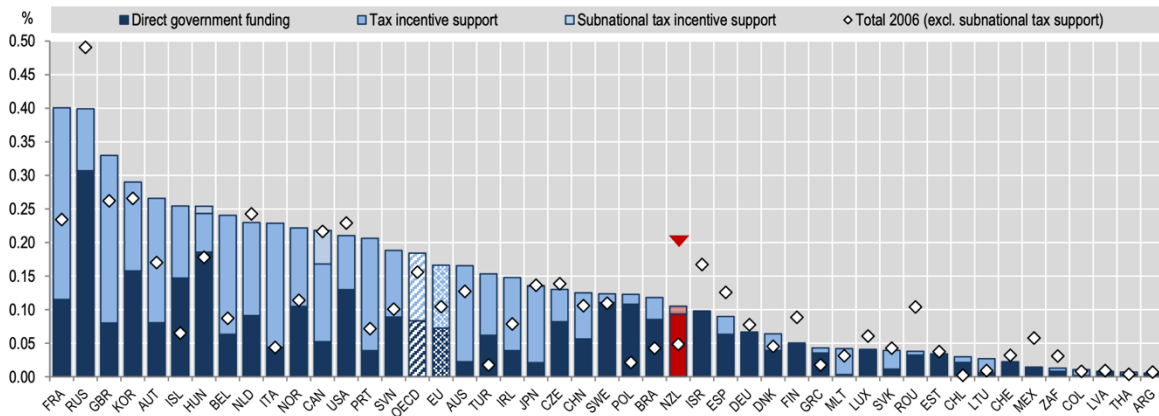
*(Ontario Budget, 2019, p. 161)*

The creation of jobs may not be the ‘intention’ outlined by the budget; however, it continues to be the desired outcome for both the federal and provincial governments. After 2019, R&D

intentions had a reduced presence in the provincial budgets and reports going forward. The 2020 budget did reflect minimal changes due to the COVID-19 pandemic in its R&D intentions (Ontario Budget, 2020). Priorities shifted to the health sector with an additional \$2 million investment in the Ontario Health Data Platform, a platform meant to explore opportunities to integrate datasets and research related to the COVID-19 (Ontario Budget, 2020).

Innovation policy in New Zealand was heavily characterized by business investment, with the newly introduced R&D tax incentive in 2017. Similar to Canada and Ontario, this R&D tax incentive essentially requires the Crown to repay eligible firms a percentage of their R&D expenditures, providing a funding averaging of NZ\$256 million per year (New Zealand Budget Economic & Fiscal Update, 2018). The only difference is that New Zealand introduced their tax incentive decades later than Canada. It is important to note, however that evidence from the government showed that 100% of the R&D tax incentive recipients were SMEs in 2018 and continue to stay the majority currently (OECD, 2020). Unfortunately, size of businesses of Canada's SR&ED are not public for comparison. In addition to New Zealand's tax credit, the Performance-based Research Fund, a fund to incentivize R&D in tertiary education was also expanded in 2017, indicating a priority for R&D through post-secondary institutions (New Zealand Budget Economic & Fiscal Update, 2017). In 2018, the economic focus of the budget was to invest in a productive economy through regional R&D investment using different tax incentives per region. Nevertheless, New Zealand was performing below the OECD average in 2018 in terms of total government support to business R&D as a percentage of GDP, shown in Figure 2 below, at a rate equivalent to 0.11% of GDP in 2018 (OECD, 2020). This is the equivalent to Ontario's sub-national tax incentive with .10%, where Canada's total government support to business R&D is twice that with .22% in 2018 (OECD, 2020).

**Figure 2.** Direct government funding of business R&D and tax incentives for R&D, 2018 (as a percentage of GDP)



Source: OECD, 2020

In 2019, the government of New Zealand released the Business Growth Agenda plan, announcing its increase support for business R&D as a percentage of GDP to 2% by 2027 (New Zealand Budget Economic & Fiscal Update, 2019). A large part of achieving this goal was the creation of the Innovation Partnerships Programme in 2019, which will be discussed in length in the policy networks analysis. Similar to Canada, the 2019 R&D plan also prioritized commercialization, initiating the Commercialisation Partner Network Fund, scaling the Technology Incubator as well as support for start-up businesses (New Zealand Budget Economic & Fiscal Update, 2019).

The New Zealand government's 2020 budget came out in May 2020, just as the COVID-19 pandemic hit, however, the New Zealand government was ahead with their policies with the announcement of the COVID-19 Innovation Acceleration Fund in March 2020, a \$25 million investment (*Beehive.govt.nz.*, 2020). The fund's objectives were to develop new products and services with the purposes of diagnosing, treating or preventing COVID-19 through R&D (*Beehive.govt.nz.*, 2020). The 2020 budget did not introduce any other new R&D intentions for innovation. The 2020 budgets focus was on R&D for environmental challenges such as the low-

emission economy, investing in the Advanced Energy Technology Platform and Agriculture Climate Change Research Platform and (New Zealand Budget Economic & Fiscal Update, 2020). Therefore, similar to Canada and Ontario, R&D investments in New Zealand went to building more R&D capacity in health research as well as innovative clinical research to the health sector. In 2021, New Zealand pivoted to a regional approach for R&D due to the pandemic, launching the Retaining Regional Science Capability to support accelerated regional growth and productivity funded by the COVID-19 Response and Recovery Fund (New Zealand Budget Economic & Fiscal Update, 2021). Funding regional institutes such as the government established Callaghan Innovation Agency, which was established back in 2013 and whose purpose is to provide a range of innovation and R&D services and grants to suit any stage of business (Callaghan Innovation Agency, 2021). This includes grants such as student grants, the Getting Started NZ\$5,000 grant for early-stage business R&D and the Project Grant that is targeted at continuous project-based innovation R&D (Callaghan Innovation Agency, 2021). Finally in 2021, in addition to these changes, the outcome also changed, where the New Zealand Government successfully expedited their policy plan for increased economy-wide R&D expenditure to 2% of GDP, originally planned for 2027, to 2021 (New Zealand Budget & Fiscal Update, 2021).

### 5.22 Entrepreneurship and SMEs as an Intention

Policies or programs with the specific intention of entrepreneurship are mixed at the federal level in Canada. Ironically, the expressed overall objective of the entire 2017 budget was to “Build a Strong Middle Class” in 2017, which entrepreneurs and SMEs are continually becoming a large contributor to (Canadian Federal Budget, 2017). Innovation Solutions was also launched in

December 2017, after the release of the federal budget, as a procurement program that allowed the federal government to work with Canadian entrepreneurs in the early pre-commercial innovation stage. In 2018, there was a shift in policy perspective as the federal budget announced its new business-centric lens. The Government of Canada introduced policies with the intention of “expanding access to entrepreneurship in Canada” (Canadian Federal Budget, p. 110, 2018), including the launch of the Women Entrepreneurship Strategy, the Aboriginal Entrepreneurship program and a new Intellectual Property Strategy (a policy network program analyzed in the subsequent sub-section). It was not until the 2018 Federal Budget that policies existed with the specific target of stimulating entrepreneurship directly rather than entrepreneurship being a secondary objective to innovation. What this means is that the primary goal and target of a policy was now focused on entrepreneurship support, not innovation or business support that may or may not impact certain entrepreneurs. Budget 2019 proposed program expansions with increased funding to existing policies and programs offered entrepreneurs by the federal government, but no new innovation initiatives with the intention of supporting SMEs or entrepreneur (Canadian Federal Budget, 2019).

The main difference observed in comparing SMEs and entrepreneurship as an intent from 2017 to 2021 is the new vision for equality and diversity in programs and support for entrepreneurs in equity-deserving and racialized groups such as Indigenous, black, LGBTQ2 people and women entrepreneurs (Canada Federal Budget, p. 136, 2021).

*“To help simplify and streamline the government’s support programs, and to help equity deserving entrepreneurs access funding and capital, mentorship, financial planning services, and business training, the government will launch the Small Business and Entrepreneurship Development Program.”*

*- Canadian Federal Budget, 2021, p. 136*

In the context of SME support, Canada's 2021 federal budget and 2020 Restart, Recover and Reimagine Prosperity Plan presented substantial changes in the following ways: technology adoption and small business financing (Canadian Federal Budget, 2021). It is clear that the overarching title of the 2021 the federal budget "A Recovery Plan for Jobs, Growth & Resilience", speaks to this ambition (Canadian Federal Budget, 2021). First, helping businesses seize technology opportunities is a priority during the pandemic as all non-essential businesses closed in-person exchanges, including the retail and the hospitality industry. The 2020 Restart, Recovery and Reimagine Prosperity Plan focused on providing SMEs digital transformation support to keep up with e-commerce giants and capitalize on the shift in consumer behaviour through programs as an intention (ISED, 2020). Moreover, the 2021 Budget committed to dedicating \$2.6 billion on a cash basis over four years to the Business Development Bank of Canada to finance technology adoption by SMEs (Canadian Federal Budget, 2021). The Small Business Financing Program is not new to Canada's innovation policies; however, the federal government made amendments to the Canada Small Business Financing Act that are projected to increase financing to small businesses by \$560 million (Canadian Federal Budget 2021). In addition, the 2021 federal budget renewed the Venture Capital Catalyst Initiative, making \$450 million available on a cash basis over 5 years with the goal of helping Canadian start-ups and businesses access more venture capital funding to support growth and create high-quality jobs (Canada Federal Budget, 2021). Therefore, Canada demonstrated an increased intention to support entrepreneurs and SMEs through innovation policies overtime by increasing capital to the current suite of innovation policies available to them. More importantly, moving from a more hands-on procurement approach in support, to a hands-off capital-based approach that was accessible to all kinds of entrepreneurs, especially marginalized and racialized ones. On top of

this, in 2020, the pandemic has pushed the Canadian government to begin focusing more on digitization supports beyond technology creation through R&D, but towards technology adoption through SMEs.

For Ontario, the presence of changing and new entrepreneurship policies has increased since the 2017 budget release as well, however with support either just increasing investment in the same things or delegating funds to municipal governments. In 2017 the province increased access to capital through venture capitalist and accelerator partnerships for entrepreneurs. Subsequently in 2018, \$15 million in funding was also directed to AI entrepreneurship, encouraging AI entrepreneurs through accelerator in Toronto (Ontario Budget, 2018). The province also introduced the Ontario Social Impact Voucher program in 2018, providing 200 vouchers for supports and services for social enterprises in Ontario (Ontario Budget, 2018). Overall, the province delegated \$0.9 billion in funds to support entrepreneurs in their talent development and business growth that year.

*“The province is contributing \$0.9 billion to build upon and strengthen economic foundations, support the development of local talent and entrepreneurs, and encourage the growth of businesses”  
(Ontario Budget, p 170, 2018).*

‘Entrepreneurship and Growth’ was then listed as one of four main economic priorities in the 2019 Budget with a focus on job creation and business growth (Ontario Budget, p. 173, 2019).

*“The Ministry will modernize its programs by assessing their relevance in driving economic growth in areas of investment attraction, research and commercialization, entrepreneurship and talent, with a focus on supporting job creation and business growth.” (Ontario Budget, p. 286, 2019).*

In addition, a significant portion of dedicated R&D funding was re-allocated to Ontario entrepreneurs programming (Ontario Budget, 2020). After the COVID-19 pandemic hit the province in 2020, the budget displayed changes in which innovation policy funding was re-allocated to entrepreneurs and SMEs for digital transformation. As a result, in June 2020, the province introduced the \$57 million Digital Main Street program (DMS) in partnership with the federal government. The program provides microgrants to help offset the costs of businesses going digital, designed to expand their customer bases online and take advantage of e-commerce opportunities (Ontario Budget, 2021). The province also introduced the Small Business Support Grant in January 2021, about 10 months after the pandemic hit. The Small Business Support Grant provides loans up to \$40,000 to SMEs and entrepreneurs affected by the pandemic to help with ongoing expenses (Mongeon, 2021). Lastly, the 2021 budget announced a \$400 million investment over 4 years to develop the Invest Ontario Fund, a fund that encourages investments in key sectors such as manufacturing, technology, and life sciences (Mongeon, 2021). Overall, both Canada and Ontario prove a shift in SME and entrepreneurship intentions to incorporate supports for technology and life science investments after the pandemic hit the nation.

After a content analysis on entrepreneurship as a policy problem for innovation across all cases, New Zealand proved to show only a few policies for enabling entrepreneurship. However, only one was new as a result of the pandemic. The Enterprise Training programme grant was introduced in 2011, a grant aimed at providing skills-based training to SME owners and entrepreneurs to develop and grow their businesses (Export & Trade Handbook, 2011). The new innovation policy as a result of the pandemic was intended for entrepreneur and SME support, developed Innovation Skills Programmes hosted by New Zealand's Innovation Agency, Callaghan Innovation (Callaghan Innovation, 2021). The policy helps businesses accelerate or

pivot through skills programs such as Innovate IP, Lean, and Capital Education (Callaghan, 2021). This shows that New Zealand did not invest significant portions of the budget nor was it a priority for the government in supporting entrepreneurs and SMEs.

**Table 2.** Policy Intention changes for R&D, SMEs and entrepreneurship due to the pandemic (Ranking in change)

Case	Pre-Pandemic (2017 – 2019)	Pandemic recovery (2020 – 2021)	Rank (#1 high - #3 low)
Canada	Post-secondary R&D for knowledge-transfer  Business R&D (SR&ED)  Middle class job creation (indicated as outcome)	New life science & biomanufacturing R&D policy for COVID-19 research  Expended existing R&D grants  Middle class job recovery  Technology adoption and small business financing	2
Ontario	Post-secondary R&D  Job creation  Entrepreneurship & business growth	Ontario Health Data platform for COVID-19 research  Digital transformation  Job creation	3
New Zealand	Post-secondary R&D  Business R&D (Tax Credit)  Skill-based training	COVID-19 R&D Innovation Acceleration Fund  COVID-19 Response and Recovery Fund for regional business R&D  Accelerate skills programs (Innovate IP, Capital education)	2

In summary, both Canada and New Zealand demonstrate a reasonable change to their innovation policy intentions due to the pandemic, with Ontario mainly adding digital transformation as a priority for the pivot to working from home due to prolonged lockdowns. Shown in Table 2. it is evident that all cases prioritized public health R&D as an intention due to the pandemic for innovation policy with allocated funding to forms of COVID-19 R&D. The

differences between Canada and New Zealand, however, is that New Zealand leveraged their existing policy experience with educational policy with skills-based training for SMEs and invested long-term into their entrepreneurs to accelerate skills during the digital transformation of businesses because of the pandemic. Canada decidedly prioritized providing services and capital to businesses to help with this transition for short-term recovery. Finally, Canada and Ontario may not have made job creation the primary intention for innovation policy pre-pandemic and in 2020 onward, but continued to make it the desired outcome for their developed innovation policies.

### *5.3 Innovation Policy Networks*

Policy networks may not always be an intention for innovation, but a mechanism to implement intentions in a more collaborative, coordinated and efficient way. Tamtik argues that policy networks focus on the effectiveness of relationships between the actors in a policy area (Tamtik, 2016). In this analysis, the focus is on both the type of policy network as well as the degree of communication (i.e., one-time consultations, proactive exchanges, etc.). It is important to note that R&D, SMEs and entrepreneurship policy networks constitute together as a whole as an innovation policy network as they all contribute to innovation, however, simply collaborate on different elements of it. Changes in policy network approach types and degrees should indicate that policy learning is taking place.

#### *5.31 Canada's Policy Networks*

Certain regions in Canada, namely in Ontario are respected internationally as a competitive innovation network such as the Toronto-Waterloo region for example. In 2018, the Toronto-

Waterloo region was ranked in the top 20 innovation ecosystems in the world (Startup Genome, 2018). That being said, it is interesting to analyze whether any formal policy networks have been established to collaborate or work with these already successful innovation hubs and whether or not policy networks have changed due to the COVID-19 pandemic.

Canada's 2017 Innovation and Skills Plan was a product of a one-time consultation from more than 100,000 Canadians who were industry leaders, academics, Indigenous leaders and government officials (Canada Innovation & Skills Plan, 2017). The feedback received was that the plan should aim to create jobs and invest in services. Although this intention is vague, it is a product of a one-time consultation type of policy network, demonstrating a bottom-up communication from each individual actor to the federal government. This is important to note as it marks the first time the federal government solicited feedback from its constituents on innovation policies. In 2018, the consultations continued with the National Digital and Data consultations as a part of the Innovation and Skills Plan mandate.

*“The National Digital and Data consultations was to better understand how Canada can drive innovation, prepare Canadians for the future of work, and ensure they have trust and confidence in how their data is used.*

*- ISED, 2020A*

The gap here is that this attempt to establish trust with the innovation ecosystem and creating a type of network in communication does not necessarily foster a relationship between actors, as it is not a proactive collaboration effort for continuous feedback.

In 2017, the federal budget determined that increasing the number of collaborations between industry, post-secondary institutions and research institutions was a goal for their R&D strategy (Canadian Federal Budget, 2017). This reflects similarities to the Triple Helix Model in policy network approaches, characterizing the goal in developing a knowledge-based network for

innovation through universities, firms and governments interacting and taking the role of the other through coordination (Etzkowitz & Zhou, 2017). What this means is that policy learning is occurring between actors, as each actor within the policy network works together on mutual R&D priorities. The following sub-analysis demonstrates that the Canadian government established quite a few policy networks in 2017, and occasionally provided funding to other entities such as research institutions to lead such collaborations and be the catalyst of coordinated information exchanges. However, these networks did in fact change due to the pandemic

An example of the government funding other entities to lead policy networks is the Canadian Institute for Advanced Research (CIFAR) where the 2017 federal budget proposed a renewed and enhanced investment in the network, which is an already-established collaborative research network led by Canadian and international researchers on all topics (Canadian Federal Budget, 2017). A more specialized effort by the federal government was the launch of the PanCanadian Artificial Intelligence Strategy, a new policy network for research and talent aimed to promote collaboration between Canada's main AI centres in Montréal, Toronto-Waterloo and Edmonton (Canadian Federal Budget, 2017). In addition, another policy network the federal government aimed to foster in 2017 was the innovation-skills network with provinces and territories, businesses, academic institutions and not-for-profit organizations to “explore new and innovative approaches to skills development and share information and analysis to help inform future skills investments and programming” (Canadian Federal Budget, p. 57, 2017).

The Supercluster program, however, is the country's 2017 signature initiative introduced, which was given a generous \$950 million investment over 5 years to help the creation of businesses-led innovation “superclusters” with the “greatest potential to accelerate economic growth” (Canadian Federal Budget, p. 79, 2017). Superclusters are areas of targeted business

interest that include SMEs, non-profit organizations, academic institutions and accelerators that work collaboratively to improve innovation and growth in specific, geographically diverse sectors: Digital Technology (British Columbia), Protein Industries Canada (Prairies), Next Generation Manufacturing (Ontario), Scale AI (Quebec) and Ocean (Atlantic Canada) (Knublely, 2021). The Digital Technology Supercluster has proven to be a helpful solution during the pandemic with its COVID Cloud project as an example by providing real-time DNA data to scientists and the government to make decisions on public health and vaccine efforts (Knublely, 2021).

In the 2019 federal budget, a new specialized program focused on innovation collaboration in the oil and gas sector was launched: the Clean Resource Innovation Network. It aimed to bring together a diverse set of actors: SMEs, large corporations, entrepreneurs, not-for-profits and academic institutions (Federal Budget, 2019). In addition, the promised intent for an Intellectual Property Strategy set out in 2018 began its implementation in 2020.

*“The Government is now implementing its IP strategy, which is encouraging new opportunities for patent pools and IP services to build savvy in an economy of intangibles. Both of these broad initiatives could be further operationalized in partnership with industry to promote public-private collaboration and to fully leverage the value of our assets. The goal should be to unlock responsible and innovative use of data and ensure Canadian firms capture value from their IP.”*

*- Restart, Recover, Reimagine Prosperity for All  
Canadians Report, 2020, p. 52*

Through this strategy, the federal government signalled an aim to create an ecosystem that hopes to encourage Canadian businesses to focus on their IP rights and protection and therefore become a global competitor in innovation. Unfortunately, in 2019 only 12% of patent filings in Canada were made by Canadians (ISED, 2019). The IP Strategy demonstrates a change between 2017 and 2018 from funding networks that are intended to enhance skill development and triple-helix

R&D collaborations, towards wealth creation through patent pooling and increased IP services amongst all actors in the innovation ecosystem.

Only one new policy network came into fruition due to the pandemic, and that is the CanCOVID Network. The CanCOVID Network is a policy network with experts from Canada's science, policy and health communities for R&D (Government of Canada, 2020). The purpose of this policy network is to enable evidence-based decision making by the federal government by providing a platform for members to collaborate on critical R&D areas such as clinical trials and testing, as well as collaborate with regional/local networks with workers on the frontlines (Government of Canada, 2020). Although, this is arguably not an innovation policy network, but another COVID-19 research and recovery advancement policy without an innovation trajectory.

This does show that the federal government overtime has also changed its frequency in engagement to a more proactive for other policy areas due to the pandemic in order to stay up to date on the changing needs and policy priorities of actors in its policy network, yet innovation no longer is at the forefront. The change overtime also demonstrates a transition from a triple-helix model to a systems approach. What this means is, instead of actors within the innovation policy network learning *with* one another and working on a specialized project directed and approved by the government (i.e., the Supercluster initiative), actors are learning *from* one another by allowing ideas to initially develop from other actors in addition to its own development to learn from., however not within the innovation policy arena.

### 5.32 Ontario's Innovation Policy Networks

Although the term is no longer used by the provincial government, the entities within the Ontario Network of Entrepreneurs (ONE) has been the province's primary growing network for

entrepreneur support for decades. It consists of 87 government-funded small business centres, which have been brought together by using a “no wrong door” approach to ensure small businesses and entrepreneurs have the tools they need to start and grow their small business. This includes business advisory, connecting entrepreneurs to the business community through events and partnerships, online resources such as the e-business toolkit and grants up to \$5,000 to start a business for adults and youth. The online resources range from guides on how to develop a business plan to accounting to provincial and federal regulations to help navigate the legal and financial processes around starting a business (Small Business Access, 2021). ONE is also connected to the Angel Network Program of angel investors in Ontario to help small businesses and entrepreneurs acquire external investment (MentorWorks, 2019). The different types of support centres within the network are listed in Table 3 below, describing the delegated purpose and services outlined by the Ontario government.

**Table 3.** Member groups of the ONE Network

<b>Type of Centre in ONE</b>	<b>Purpose/Service</b>
Regional Innovation Centres (RICs)	Focuses on advising promising entrepreneurs of high innovation and technology-based start-ups.
Community Future Development Corporations (CFDCs)	Provide services such as loans to small rural businesses that are unable to get loans from traditional sources (i.e., banks).
Economic Development Corporations (EDCs)	Focuses on broader regional economic development initiatives and providing advisory to small businesses.
Small Business Enterprise Centres (SBECs)	Focuses on starting and growing small business economic growth in their allocated regions (small-to-midsize cities/towns).

Source: Small Business Access, 2021

As we can see in Table 3, there are a variety of different members in the ONE that serve both entrepreneurship and innovation needs. Between 2017 and 2021, provincial budgets did not present any new changes to the ONE, not even increased funds. From 2016 onward, Ontario has used this network to catalyze programs and pilots that support both innovation R&D, commercialization, and entrepreneurship: e.g., Starter Company Plus, which offers \$5,000 to

entrepreneurs to start their business and a variety of alternative programs that take in businesses and entrepreneurs and provides mentorship, workshops and networking opportunities (Small Business Access, 2021).

The ONE is exemplary of the regional innovation system (RIS) approach in that it focuses on firms and institutions of its innovation system and the interdependencies in each specific region. However, outside of capital to start a business, funding to entrepreneurs and SMEs to conduct R&D and scale is limited. Some regions will require more support for entrepreneurs to simply start a small business (provided by Small Business Enterprise Centre's) versus support for innovation for high-tech small businesses (provided by Regional Innovation Centre's). The province's lack of a policy learning approach to innovation policy networks due to COVID-19 is like that of Canada. It may not be transparent; however it seems based on this analysis, that Ontario does not have an interest in fostering a stronger innovation policy network due to the pandemic thus far.

### 5.33 New Zealand's Innovation Policy Networks

New Zealand has one main policy network initiative, the 2019 development of the Innovation Partnerships Programme (IPP), led by the Ministry of Research, Science and Innovation, now known as the Ministry of Business, Innovation and Employment (MBIE). The IPP's purpose is to "help R&D intensive businesses connect, collaborate and invest in New Zealand" (MBIE, 2021). The IPP is a policy network that includes its designated innovation agency, Callaghan Innovation, the Ministry of Trade and Enterprise, as well as multiple local and central agencies and governments to support collaborative efforts to influence R&D oriented decisions. The network invites key international experts and investors from companies "that are pushing the boundaries of technology and solving the world's big problems" to align them with the best

investment opportunities in their country (Williams, 2021). The long-term vision for the policy network is described by the Ministry of Business, Innovation and Employment both by its goal for raising R&D to 2% of GDP by 2027 and by looking at the desired outcome as sustainability, diversification, inclusivity and productivity. Part of the promise to diversity and be inclusive is the government's Investment Attractions program, which is a part of the IPP that offers an investors visa. The visa is open to international investors who wish to invest a minimum of NZD 3 million in New Zealand over 4 years (MBIE, 2021). In addition, the New Zealand Growth Capital Partners established in partnership with the Ministry of Trade and Enterprise, is a policy that focuses on building investments in early-stage businesses in New Zealand by encouraging investors to co-invest in the fund (MBIE, 2021). The IPP policy network characterizes Lundvall's Systems approach to innovation policy networks in which the focus on the policy network is a social arrangement of elements and relationships that interact in the production and diffusion of new or improved economically useful knowledge (Lundvall, 2009; found in Tamtik, 2016). Arguably, diversification, inclusivity and productivity are products of collaborative relationships within a network

Due to the COVID-19 pandemic in 2020, New Zealand had to pause the physical aspects of the Investment Attractions program because of the closed borders, which therefore made connecting with international investors, one of the priorities for the policy network, difficult to cultivate and maintain (Williams, 2021). However, the program continued virtually to maintain those investor relations. As a result of New Zealand's rapid and diligent response to the pandemic, the borders are due to open shortly. Dr. Peter Crabtree, Manager of science, innovation and international and who leads IPP said that interest in New Zealand as a destination for R&D also accelerated as a result of their response to the pandemic (Williams, 2021). This

demonstrates that trust from international investors in the government’s ability to be resilient in other areas in addition to innovation, influence their investment decisions. With direct investment as a priority, New Zealand’s government promises that job creation and skill development will naturally follow suit (Williams, 2021). Regardless of the borders closing, New Zealand maintained a relationship and trust with those investors throughout their diligent pandemic management.

In 2021, the New Zealand government invested in the Regional Strategic Partnership Fund (RSPF). The RSPF is a pandemic recovery initiative to support regional economic development priorities deemed by the government as productivity, resiliency, inclusivity and sustainability in their provincial economies (New Zealand Economic & Fiscal Update, 2021). The government took on this new regional partnership approach to help ensure that the projects, programs and initiatives that are funded are identified locally as key priorities for their individual economies, overall allowing each region to help decide on their unique priorities. Funded through the Provincial Growth Fund, a total of \$200 million and \$66.110 million to be reprioritized budget dollars is being invested from existing commitments (New Zealand Economic & Fiscal Update, 2021).

*“Creating the Regional Strategic Partnership Fund is a significant move and represents another step toward creating a productive, innovative, resilient and sustainable economy.”*

*– Honourable Stuart Nash, Minister Economic & Regional Development New Zealand, 2021*

The RSPF emulates elements of both the Regional Innovation System (RIS) approach and the ‘whole of government’ perspective rather than a narrow sectorial one, to avoid overlap of policies and create a formal mechanism for coordination across governments as well as private actors in the innovation ecosystem. The New Zealand Provincial Development Unit leads the

partnership program in which the department will work in consultation with other parts of government in addition to the private sector “to ensure a more effective all of government regional economic development strategy” (New Zealand Government News Release, 2021).

Overall, referring to Table 4, the New Zealand’s policy network approach illustrates no additional funding in the IPP in the 2021 budget, just ambitions to reinstate the program as soon as borders open shortly. However, the RSPF proves to be an innovation policy network program that was initiated by the challenges the pandemic has created for regional economies in New Zealand, a regional innovation system approach never done before in the country.

**Table 4.** Innovation Policy Network changes due to the pandemic (Ranking in change)

Case	Pre-Pandemic (2017 – 2019)	Pandemic recovery (2020 – 2021)	Rank (#1 high - #3 low)
Canada	Triple-helix innovation R&D policy network	Triple-helix innovation R&D policy network  No new changes – pivoted to COVID-19 recovery networks	3
Ontario	Regional Innovation System (RIS)	Regional Innovation System (RIS)  No new changes or increased funds	3
New Zealand	Lundvall’s Systems approach	Regional Innovation System (RIS) – Productivity, resiliency and inclusivity	1

*5.4 Experimental Innovation Policy*

In addition to establishing policy networks in order to learn from other actors in the innovation ecosystem, those actors, specifically governments should be experimenting with policies and programs to test out what works and adapts well with the economy. As mentioned in the literature, experimental policy intention, the structure, and evidence should specifically be about strategic policy learning by demonstrating either a policy or strategy that is intended for testing

out new ideas and checking in on outcomes to evaluate those ideas. In this sub-section, an analysis on whether experimental policy is not only present but also changing is conducted, as well as if the evaluation of the policy that is being tested is proactive or reactive to societal challenges such as the pandemic.

#### 5.41 Experimental Innovation Policy in Canada

In the 2017 Federal Budget, Canada initiated a ‘whole-of-government’ review of business innovation programs by partnering with external experts to ensure that business innovation programs are simple, effective and meet the needs of Canada’s innovators (Canadian Federal Budget, 2017). In addition, the Impact Canada Fund was introduced as a new ‘mission’ or ‘challenge’ based approach that focused on accelerating innovation efforts towards big challenges such as environmental issues through clean technology. A challenge-based approach on innovation policy is proposing challenge specific innovation programs such as a program strictly meant to decrease greenhouse gases. The Impact Canada Fund also hosted the Smart Cities Challenge which is an open competition for municipalities, regional and Indigenous communities across Canada to address local issues residence face through the use of data and connected technology (Canadian Federal Budget, 2017). \$8.1 million dollars was invested over 5 years to review the implementation of the Impact Canada Fund in commitment to more government program experimentation. The Impact Canada Fund is a good example policy proactive experimentation meant to provoke regions and municipalities to test new innovations that work within their economies. The funding approved by the Treasury Board of Canada Secretariat is aligned with a dedicated fixed budget to experimentation at a local level.

*“This initiative will also help advance the President of the Treasury Board’s mandate commitment to devote a fixed percentage of government program funds to experimentation” - Canadian Federal Budget, 2017, p. 181*

In collaboration with the research done in the Impact Canada Fund, the introduction of women targeted entrepreneurship opportunities was also a goal for the 2017 budget. This meant the National Research Council dedicated efforts to examining the future role of women researchers and innovators (Canadian Federal Budget, 2017).

A large part of policy experimentation is having the proactive evaluative mechanisms in place to determine policy effectiveness of the experiment and to either stop, start or adjust the policy before too much is invested. The 2018 Budget committed to placing evidence at the centre of program evaluation and design, investing \$1 million per year ongoing to the Business Innovation and Growth Support program. Through this program, Statistics Canada and the Treasury Board Secretariat to improve performance evaluations for all innovation-related programs (Canadian Federal Budget, 2018). In April 2020, the Canadian Survey of Business Conditions was launched with the goal of providing “timely measurement of business and economic indicators and better understand changing business conditions. To further this work with partners and enhance the availability of real-time business indicator data” (Canadian Federal Budget, 2020).

Once the pandemic hit the Canadian population in March 2020, a shift in both consumers and suppliers staying home or working from home challenged the economy. Unfortunately, experimental innovation policy did not occur due to the pandemic. The federal government did offer wage and rent subsidies, which are the bare minimum of business survival, but no new experimental policies that enable for more innovative solutions. Loans are offered to businesses at all stages from banks such as BDC. Most of Canada’s innovation policies during the pandemic

were reactionary especially due to the previous efforts for placing evidence at the centre of program evaluation, those efforts are not publicly available so to the everyday Canadian, it is not known what the government is doing to experiment, reflect and improve their innovative policies.

#### 5.42 Experimental Innovation Policy in Ontario

The province of Ontario presents a couple examples of innovation policy experimentation, especially recently as a reaction to the pandemic. Digital Main Street (DMS) is an example of a program that initiated in 2016 by the city of Toronto with the purpose of assisting main street businesses (mom and pop shops) in growing their business operations through technology with tools and resources that are easy to use (City of Toronto, 2020). From 2016 up until before the pandemic, the DMS program in Toronto engaged with more than 8,000 local businesses and provided one-on-one consults to 2,500+ businesses. Prior to this, 30% of Toronto businesses had no online presence which quickly translated to this 30% moving to online with an additional 66% expanding their online presence in Toronto. The program within its municipal parameters was clearly successful (City of Toronto, 2020). In June 2020, in reaction to the COVID-19 pandemic, the province partnered with the federal government to invest \$57 million in scaling the project to support small businesses across Ontario, not just in Toronto (City of Toronto, 2020). In addition, the 2021 provincial budget promised to enhance funding to the DMS program after the program generated 1,400 jobs for students and provided close to 20,000 Mainstreet small businesses with support for their digital expansion (Provincial Budget, 2021). The DMS program is exemplary of a reactionary experiment of innovation policy with digital adoption.

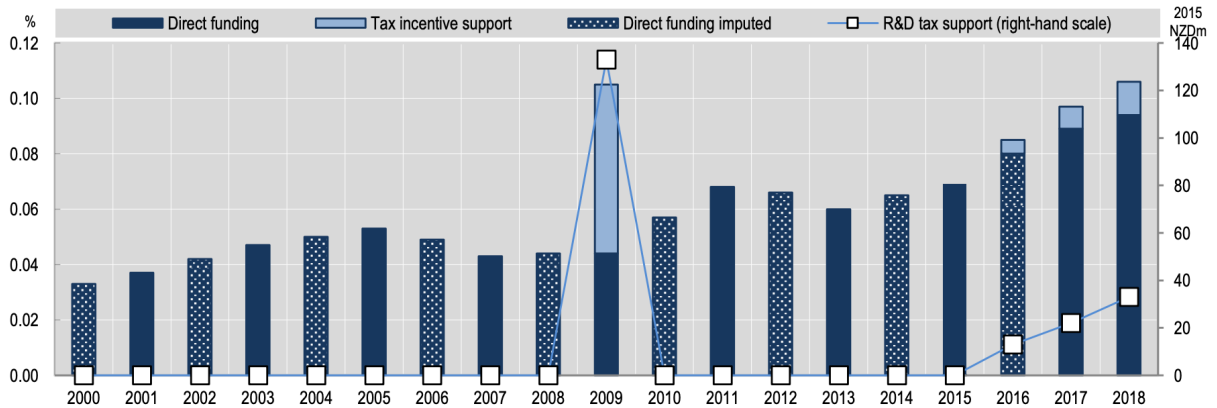
Previously in 2018, in the Ontario Economic Outlook and Fiscal Review, a promise to review policies that support R&D was made to ensure effective and efficient innovation programs (Ontario Budget, 2018). The review involves consultations with Ontario businesses and examination of the Ontario Tax Credit, the 8% tax credit for R&D expenditures for SMEs. Overall, the goal was to ensure Ontario entrepreneurs have enhanced access to Provincial R&D support. The Ontario Tax Credit did not change since, and unfortunately had no reviews published to better understand if policy learning did occur from Ontario's innovation previous innovation programs.

#### 5.43 Experimental Innovation Policy in New Zealand

Hints of innovation policy experimentation began in 2008 for New Zealand when the government temporarily experimented with the refundable R&D tax credit for the year (OECD, 2020). In 2015, the New Zealand government then reintroduced the R&D tax incentive but expanding the eligible R&D expenditures to land and buildings which are a large part to R&D infrastructure and labs. This change was received well by SMEs and entrepreneurs, which led the government to introduce a new refundable tax credit at a 15% rate (OECD, 2020). Compared to Canada, 2008 is late to experiment with innovation policy, yet New Zealand took on a more interval like way where it was tested temporarily for a year then reinstated in 2015 show in Figure 3 below versus Canada incrementally making changes over time. The graph demonstrates a slight increase in R&D as a percentage of New Zealand's GDP overtime since the introduction of the 2008 R&D tax credit that initiated the following fiscal year. Notice that the funding for the tax credit in 2009 was substantially higher than that of 2016. The trial year in 2009 with heavy

tax credit investment allowed the New Zealand government to test out what worked and to go back to the drawing table to strategize a more cost effective and long-term policy for the future.

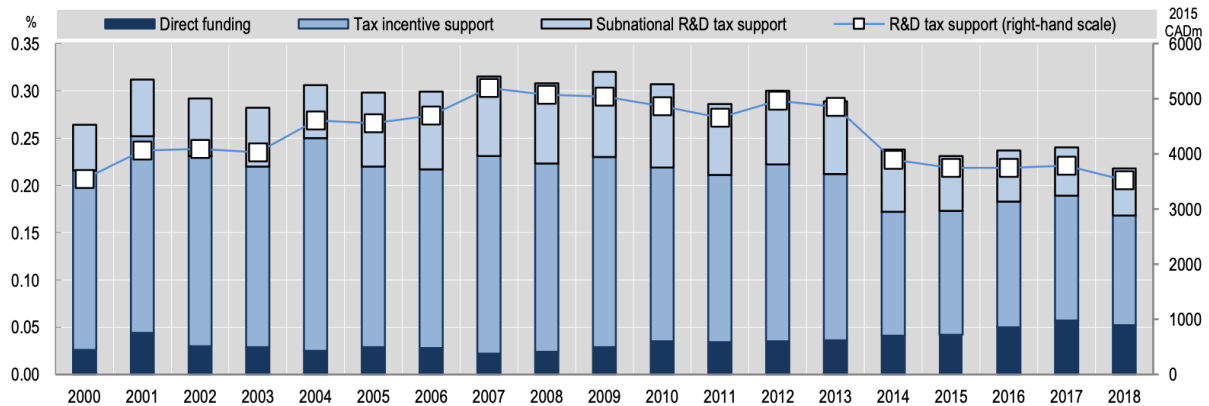
**Figure 3.** Direct funding of business R&D and tax incentives for R&D, New Zealand 2000-18 (As a percentage of GDP)



Source: OECD, 2020

Figure 4 is Canada’s R&D and SR&ED as a percentage of GDP with the purpose of comparing progress and degree of investment tested overtime with New Zealand and the effectiveness of its innovation policy experimentation. This was not analyzed in the R&D intentions as no change to the SR&ED policy occurred between 2017 – 2021. Although Canada is ahead of New Zealand in R&D and R&D tax support as a percentage of GDP, Canada’s direct government funding is presenting a steady decline since 2013, which was also the same year the last change to the SR&ED tax credit was made (OECD, 2020).

**Figure 4.** Direct government funding of business R&D and tax incentives for R&D, Canada, 2000-18 (As a percentage of GDP)



Source: OECD, 2020

The New Zealand government in 2018 also started to understand the importance of evaluating its innovation policies to know what is working and what is not overtime. The National Research Information System (NRIS) was a new funded initiative in 2018 that delivered an information system that supported improved performance and transparency of all science investments in the country (New Zealand Budget & Economic Fiscal Update, 2018). The New Zealand government described it to the public as “developing a fit for purpose research information structure”, which reinforces a purposeful and transparent initiative to its constituents (MBIE, 2019). The database of the NRIS is publicly accessible to all, which includes a diverse set of research related operational data such as the number of awarded funding granted, the amount of funding, type of research activity, and the organizations/individuals it goes to etc. (MBIE, 2019). The established NRIS database was also leveraged by the New Zealand government for the purposes of tracking COVID-19 research responses. This publicly available research not only focuses on public health and clinical science, but on non-medical research that is focused on areas such as policy, psychology and tourism (MBIE, 2021A).

*“This reflects research projects identified in the COVID-19 Research Database where any are specifically looking at the effects of lockdown on mental health*

*and well-being of people of all ages and the impact of the government response and how this may impact recovery”*  
*- MBIE, 2021A*

This level of transparent data was available pre-pandemic and now being leveraged for pandemic recovery. A good example of a current policy adapting to the current economic or societal needs of the country that can also help benefit and improve future policies.

**Table 5. Experimental Innovation Policy Changes due to the pandemic (Ranking in change)**

Case	Pre-Pandemic (2017 – 2019)	Pandemic recovery (2020 – 2021)	Reactive or Proactive policy	Rank (#1 high - #3 low)
Canada	Canada Impact Fund: Environmental innovation policy (i.e., clean technology)	No innovation policies. Executed subsidies for wages and rent.	Reactive	3
Ontario	Toronto DMS	Province-wide DMS	Proactive	2
New Zealand	R&D Tax Credit & NRIS transparent database of science investments	R&D Tax Credit NRIS COVID-19 research response database	Proactive	2

Based on Table 5 for changes in experimental innovation policy, it is clear that all the cases demonstrated very little change, however New Zealand and Ontario with the most change amongst the cases analyzed. It is important to note that little change may not necessarily be a bad thing. No change in experimental policy might mean experimented innovation policy conducted prior to the pandemic, such is the case in New Zealand, prepared the government to leverage those experimented innovation policies to provide solutions during the pandemic. Policies such as the New Zealand R&D Tax credit or the Ontario DMS policy are good examples of this. Canada, however, has no publicly available data or information on whether current innovation policies presented in the intentions sub-analysis is informed by experimentation, so therefore it is difficult to assess.

## 6. Discussion

Applying the policy learning analytical framework, the intentions for innovation policy, innovation policy networks and experimentation were examined for change due to the pandemic in Canada, Ontario and New Zealand. The question is why certain policies changed due to the pandemic? The findings present three gaps in Canada's approach to innovation policy: concentrated innovation policy intentions, lack of proactive collaboration for innovation policy networks and lack of transparent experimental innovation policy.

### *6.1 Concentrated Innovation Policy Intentions*

McKelvey and Saemundson's intentions approach captures policy learning because it is an indicator in which government intentions are dynamic and context specific and not concentrated in one area amongst institutional, social or political changes (McKelvey and Saemundson, 2017). The different policy intentions of each case overtime created a foundation for the degree of its policy network presence and strength as well as policy experimentation. Analyzing the changing nature of policy intentions due to the pandemic, specifically for R&D, entrepreneurship and SMEs, it is clear that policy learning was a path Canada was striving for in the 2017 Innovation and Skills Plan prior. Job creation and R&D are the two identified intentions that the government started with in 2017 and returned to as a recovery goal in 2020 during the pandemic, in a sort of cyclical nature. However, the R&D efforts did pivot to a concentrated effort to COVID-19 response research. This was a trend amongst all cases. Also, the concentrated effort on job creation through talent or SMEs and on R&D is an analyzed difference between Canada and New Zealand. New Zealand did not focus on the concentrated outcome of job creation, but developed long term goals for increased business capital, R&D GDP, training in its

entrepreneurs, direct investment and commercialization. Demonstrating effort and investment in multiple areas that contribute to the innovation cycle, not just some of the phases such as R&D and job creation.

A critical finding from the analysis is that no substantial innovation policy changes were observed due to the pandemic for New Zealand and Canada. Some reasonable changes were analyzed, however most policies during the pandemic were enhanced versions of a previous existing policy. This does not necessarily mean policy learning did not occur, nor does policy learning require policy change, it potentially means it was happening in a more proactive way in advance of the pandemic versus reactive to the pandemic. Resilience and sustainability were a stated government intention and objective for new Zealand's suite of innovation policies both prior to the pandemic and during, which presents a level of long-term planning for policy learning. This could mean that the government is more likely to stick to the policy, even during a shock to the economy. Arguably, this is the same case for Canada with the primary intentions consistently revolving around middle-class jobs, reinforcing that short-term goal.

The comparison of these three cases overall helps support the importance of policy learning prior to economic challenges as it creates a more resilient and a less risk adverse economy. Canada was on the path from 2017 to slow and incremental changes that would have potentially developed in more opportunities for policy learning, whether it was through increase policy experimentation or expanding policy networks. However, in terms of long-term economic sustainability and resilience, Canada may need to take a page from New Zealand's long-term approach to the pandemic as the pandemic potentially could be a wake-up call for Canadian policy makers to start planning beyond a recovery model for innovation policy. Putting too much

emphasis on only certain elements of innovation such as R&D creates more risk since R&D does not necessarily impact all innovation outputs.

New Zealand is also quite new to the innovation policy game in comparison to Canada, with innovation policy becoming a priority only recently from the R&D tax incentive in 2017 (experimented in 2008), the Innovation Partnerships Program (IPP) network in 2019 to the 2019 National Research Information system for future experimentation. However, New Zealand is not necessarily behind in the innovation policy arena. According to the Global Innovation Index, New Zealand’s R&D ranking was only a few ranks behind Canada’s in 2020 (see Table 6). Moreover, it moved up in ranks 2020 while Canada moved down (see Table 6). This demonstrates that the policy learning New Zealand exhibits is a more recent development and is accelerating, potentially faster than that of Canada’s. Canada’s R&D intentions for innovation policy and its policy networks have been around for more than 15 years with slow and incremental changes with the SR&ED tax credit and older established networks such as those with accelerators and post-secondary institutions in Ontario.

**Table 6.** Global Innovation Index – Innovation R&D Rankings

Country/Year	2017	2018	2019	2020 (Pandemic Year)	Change Status
Canada	15th	15th	15 <sup>th</sup>	18 <sup>th</sup>	Yes – Decrease
New Zealand	23rd	22nd	23rd	21st	Yes - Increase

### *6.2. Lack of a Proactive Collaboration for Innovation Policy Networks*

Another example of policy learning is proactive collaboration in policy networks as opposed to one-time consultations. Streamlining mutual goals continuously keeps policy makers aligned with other policy actors, increasing the likelihood of collaborating not only by communication but through aligned projects such as Canada’s Supercluster program (Tamtik, 2016). However,

superclusters are confined to Canadian borders and the specific industries the government chooses to identify for investment and collaboration. Whereas New Zealand's IPP policy network is open to any industry and additionally looks to attract foreign investors into those networks. With digital adoption, New Zealand was still able to maintain the inclusion of foreign investors during the pandemic. It is important to note Ontario's Digital Main Street (DMS) program was the only digital adoption innovation policy cited in the research. Many countries conduct Information Communication Technology (ICT) R&D but did not invest in the digital adoption before the pandemic. With the success of DMS, it may be of interest to explore the need for more digital adoption within policy networks to communicate and collaborate as well as externally for those SMEs and entrepreneurs to communicate with consumers.

### *6.3 Lack of Transparent Experimental Innovation Policy*

Innovation policy experimentation is a mechanism for coordinated risk in the case of resiliency. In order to learn, policymakers must take some risks with policy experimentation and have resources and tools in place to proactively keep track outcomes in order to effectively test different policies (Bravo-Biosca, 2020). With tools to track, reflect and evaluate those policy experiments, actors in the innovation ecosystem such as SMEs may gain trust in the government's ability to create new economic opportunities. Canada began to prioritize experimentation by allocating a fixed percentage of government program funds to experimentation (Canadian Federal Budget, 2017). However, no notable policies came into fruition from this initiative. Reactive policy experimentation occurred due to the pandemic as opposed to Ontario, which had the Digital Main Street program being tested prior to the pandemic on a municipal level and was able to leverage its success to create a province-wide

digital solution innovation policy for SMEs and entrepreneurs (City of Toronto, 2020). New Zealand has the NRIS research database that includes research on policy and other areas, which is now being additionally leveraged for COVID-19 response impact on citizens (MBIE, 2021A). Another mechanism for establishing trust and accountability to their intention for sustainability and resilience in their budgets. Overall, creating a society with less risk aversion when it comes to innovation is an important policy learning process that will take time for Canada. How this can be addressed is for the Canadian federal government itself being having less risk aversion when experimenting with innovation policies. The current short-term approach for job recovery due to the nations adequate pandemic management and prolonged sporadic lockdowns is an outcome that could have been avoided if more experimentation started as early as New Zealand's in 2008, subsequently developing trust and creating more resilient innovation policy.

Additionally, the Canadian and Ontario governments have not had the best pandemic management track record, especially when compared to New Zealand. With a slow recovery, policy actors in the innovation ecosystem in Canada could likely lose trust in the government's ability to keep the economy resilient with its policies if there is no transparent evaluation of the government's policies. The country's adequate pandemic management could therefore exacerbate the prior stage of risk aversion that made commercialization and business investment so difficult for Canadians to develop before the pandemic. Now with the successful pandemic management, its constituents can believe in their government to keep the economy from falling. Another example that supports this sentiment is the opening of New Zealand's borders provoking accelerated interest in the IPP and new direct investment in the innovation ecosystem as a result of good public recognition of the country's pandemic management and therefore trusting the resiliency of their economy.

## 7. Recommendations

Based on the aforementioned findings from the analysis, this paper attempts to propose three high-level recommendations for policy and practice for Canadian policymakers. These recommendations are also informed by the progression of the comparative case of New Zealand. The paper proposes establishing a long-term innovation strategy with diverse policies that reflect the dynamic stages of innovation, fostering proactive collaborative innovation policy networks and creating transparent innovation policy experiments. All of these recommendations would be an initial step for Canada to begin establishing an innovation policy structure and economy built for opportunities for policy learning in a post-pandemic world.

### *7.1 Establish a Long-term Innovation Strategy with Diverse Policies that Reflect the Dynamic Stages of Innovation*

Canada would potentially benefit from looking into other areas of innovation to invest heavily in with a different prioritized outcome other than job creation. Possibly, an educational approach to innovation such as skills training or educational resources versus policies focused on capital. Additionally, diversifying beyond R&D efforts, which the country has been leaning on as an innovation policy input for decades. Changing these intentions not only for job creation, but to become a sustainable and resilient economy that could withstand economic shocks like the COVID-19 pandemic.

### *7.2 Fostering Proactive Collaborative Innovation Policy Networks*

The findings show Canada's, as well as Ontario's lack of proactive innovation policy network changes due to the pandemic, while New Zealand created a platform for consistent collaboration

with experts for evidence-based policy, as well as a more regional network approach to adapt to the differing regional challenges of the pandemic. Instead of one-time consultations, a platform for proactive collaborative networking between policy actors would be beneficial for the exchange of policy learning between actors in the innovation ecosystem.

### *7.3 Developing Transparent Innovation Policy Experiments*

Although Canada expressed intentions and funding towards experimental innovation policy, they are not transparent to the public to be held accountable for policy learning. A transparent database or system similar to that of New Zealand's could potentially put Canada's federal government in a more reliable position that could have less risk aversion and more resilience. How else can other actors in the innovation ecosystem provide input if what is happening within the governments walls is unknown?

## **8. Conclusion**

Policy learning from the challenges that the Canadian federal government experienced from the pandemic is an important discussion added to current innovation policy literature, as new studies will analyze the resulting innovation policy ecosystem within Canada in the years to come. The combination of innovation intention, innovation policy networks and experimental innovation policy were used to analyze changes due to the pandemic as well as policy learning. The reasons for those changes are shown to be mainly a result of risk aversion and a short-term approach to innovation policy. It is therefore important that the Canadian federal government reflects on this past year and a half and implement the recommendations for policy and practice proposed by this paper, in order to set the current innovation policy structure up to not repeat policy mistakes and

for successful learning and improvement. Using Ontario and New Zealand as comparative cases helped highlight Canada’s potential gaps in policy learning during the pandemic for innovation policy. After almost five years since the Innovation and Skills Strategy, the hope is the pandemic has taught Canadian policymakers that it is time for more policy learning foresight.

## 9. Appendix

### *Appendix A: Timeline New Zealand’s Science System developments from 1984 to 2012*

Year	Structural arrangement	Focus of policy discourse
1984	Separation of public policy and operational functions of science, introduction of contestable science funding	Excellence in science
1989	Creation of two government agencies Ministry of Research, Science and Technology (MoRST) and Foundation of Research, Science and Technology (FRST)	Excellence in science
1992	Establishment of Crown Research Institutes (CRIs)	Fluctuating emphasis on excellence in science and relevance for end-users
2000	FRST launches investment discourse	Sound investments in science for New Zealand
2011	Disbandment of MoRST and FRST. Establishment of Ministry of Science and Innovation (MSI)	Innovation for economic growth
2012	MSI is incorporated into ‘super ministry’, Ministry of Business, Innovation and Employment (MBIE)	Innovation for economic growth and ‘business facing’ agencies

Source: Leitch et al., p. 121, 2013

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