

DESIGNING EQUALITY OF OPPORTUNITY  
IN NATIONAL INNOVATION SYSTEMS

Moving Towards Gender Conscious  
Policy, Performance Measurement, and Resource Allocation

By ANDREA MAY ROWE B.A., M.P.A

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AUTHOR: Andrea May Rowe B.A. (University of Victoria), M.P.A. (University of  
Victoria)

SUPERVISOR: Dr. Ahmed Shafiqul Huque

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## **Abstract**

The purpose of this study is to explain the variation in approaches to gender equality and innovation in Canada and Sweden through the study of policy, performance measurement, and resource allocation. This is the first study of its kind in comparative public policy to explore differences in gender equality and innovation policy in Canada and Sweden. This research also contributes more widely to the existing body of gender and public policy and innovation literature in Canada and Sweden respectively. This qualitative case study includes 44 interviews with innovation leaders in the public sector, private sector, and academia as well as policy experts at the OECD. This dissertation challenges assumptions about the social and economic power dynamics reflected in current innovation systems in both countries, through the theoretical lens of feminist institutionalism. The findings highlight similarities in the challenges faced in both countries to create gender equality in innovation spaces, despite differences in economic assets and welfare state models. The findings also explain the multiplicative effects of gender inequality at the intersection of institutions: university, government, and private sector.

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## **Abbreviations**

EU	European Union
ICT	Information and Communication Technology
IRIC	Industrial Research and Innovation Council
MNE	Multinational Enterprise
MIT	Massachusetts Institute of Technology
OECD	Organization for Economic Cooperation and Development
NGO	Non-Governmental Organization
R&D	Research and Development
SME	Small and Medium Sized Enterprises
STEM	Science Technology Engineering and Mathematics
UN	United Nations
UNCTAD	United Nations Conference on Trade and Development
WISE	Women in Science and Engineering

## **CHAPTER ONE**

### **CHAPTER 1: Introduction: Statement of the Problem and Purpose of the Study**

#### **Introduction**

What inspires innovation? “Innovation is sometimes assumed to be all about the shock of the new—scientific breakthroughs, technological leaps. But it would be more accurately defined as rearranging the resources we have to get the most out of them” (Bedell, 2014 p. 55). A person who has experienced a life challenge directly is the most likely to innovate: in effect, to solve their own problems (Macdonald, 1992). However, current systems designed to support innovation are not designed to draw diverse people with different life experiences and challenges into innovation spaces. This dissertation seeks to explain, from a gender perspective, how innovation systems in Canada and Sweden are designed. This study explores how these systems of policy, performance measurement, and resource allocation might be reimaged to support gender equality and diversity, thus changing the institutional landscape to support a wider range of innovations, and distributing the benefits of innovation in a more equitable way.

In Canada and Sweden, more women now graduate from university than men, yet women are much less likely to hold senior leadership positions in all sectors of the economy (Catalyst, 2013). In particular, women are underrepresented in leadership positions in areas of the economy associated with innovation (Catalyst, 2013). As innovation policy expands in scope and relevance within the economy, it is important to

question gender-neutral innovation norms (Andersson et al., 2012; Lindberg, 2012). Gender equality in innovation is a matter of scientific excellence, social justice, and economic rationality (Andersson et al., 2012; Kariv, 2013; Schiebinger & Klinge, 2013). This dissertation explains how policy decisions at the national level shape women's participation in innovation in the public sector, private sector, and academia in Canada and Sweden.

Innovation policy in Canada is multifaceted, with both the federal and provincial governments taking responsibility for aspects of research funding, science and technology, education, and entrepreneurship. Sweden is the only country in the world with a national innovation agency, Vinnova, explicitly committed to achieving gender equality (Andersson et al., 2012). Sweden is also ranked first as the most innovative country in the European Union's Horizon 2020 program (EU Commission, 2014). Horizon 2020 is the largest innovation program ever undertaken in the European Union, with 80 billion euros in research funding. Comparing Canada and Sweden at the national level isolates the ability of a government intervention to promote gender equality in innovation policy. Both cases in this comparison are framed by their membership in the Organization for Economic Cooperation and Development (OECD). Innovation policy is very much a product of globalization; improving economic competitiveness is a dominant factor in international innovation norms (Carlsson, 2006). The OECD is the leading international authority for innovation policy research, and the development of innovation performance indicators. National governments, including Canada and Sweden, rely on the

OECD's research and policy manuals in the development of domestic innovation programs.

This dissertation is a qualitative case study of the different approaches to gender equality in national innovation systems in Canada and Sweden. The research is divided into three main subsections: policy, performance measurement, and resource allocation. The theoretical framework draws on feminist institutionalism to explain the gendered interactions of institutions in the triple helix model. The interview sample is based on the triple helix model of university-industry-government cooperation in the development of innovation (Etzkowitz & Leydesdorff, 1996, 2000). The research methods used in the dissertation include 44 elite interviews with innovation leaders in the public sector, private sector, and academia in Canada and Sweden, as well as policy experts within the OECD. The interview data is contrasted with formal document analysis to provide a holistic comparison of representation through presence and absence of reference to gender and innovation policy across cases. The qualitative case study approach contributes to explaining how the formal and informal rules that govern policy, performance measurement, and resource allocation interact to define equality of opportunity in national innovation systems.

This dissertation contributes to knowledge in comparative public policy, as the first dissertation of its kind to provide an in-depth qualitative review of gender and innovation policy in Canada and Sweden. This study finds that Sweden is a global policy leader in the development of gender-conscious innovation policy, while Canada has yet to

consider a gender-conscious approach to innovation policy. Despite these differences, similar challenges exist in both Canada and Sweden in the implementation of practices that support diversity in national innovation systems. The findings of the study support the need for further comparative research on gender equality and innovation at the subnational level in Canada and internationally across OECD member states.

### **Statement of the Problem and Purpose of the Study**

The impact of innovation policy on gender equality in innovation opportunities and activities in Canada and Sweden has not been explored comparatively in the same depth as has traditional employment and labour market policy within the welfare state (Briskin & Eliasson, 1999; Esping-Andersen, 2009). However, innovation policy is slowly shaping access to technology, medicine, and employment, without undergoing the same type of critical analysis (Schiebinger, 2011; Schiebinger & Klinge, 2013; Schiebinger & Schraudner, 2011). Exclusion from the knowledge economy is a growing form of social inequality (Andersson et al., 2012; Hafkin & Huyer, 2006; Huyer, 2015). The function of innovation policy within the economy in Canada and Sweden is closely related to other aspects of the welfare state (Benner, 2003). Innovation is essential to maintaining and growing the high standard of living and quality of life that are hallmarks of both the Canadian and Swedish states (Benner, 2012). The costs of production in both Canada and Sweden are very high in comparison to other parts of the world. As competition increases in manufacturing, economies must diversify to support economic growth. In Canada and Sweden, much of this growth is now related to knowledge and

service-based industry. Both countries have a highly educated labor force, well situated to add value through creative applications of technology and higher-value add-ons to existing technologies (Brody et al., 2002; Edquist, 2014). Each of these distinct areas impact women's presence, absence, and capacity to be engaged in innovation within Canada and Sweden.

The global pressure to innovate has coincided with the retrenchment of the welfare state in some countries; however, the Scandinavian countries have demonstrated that this link is not inevitable (Benner, 2012). The opposite strategy taken by government to strengthen the welfare state and invest in innovation systems has contributed to Sweden's status as one of the most innovative countries in the world (GII, 2014): "The experience of the Scandinavian countries in the 1990s indicates that it is possible to retain traditional commitments to employment and social security by developing active policies for industrial renewal and support of innovation systems, technological development, scientific infrastructures and regional concentrations of industrial competence" (Benner, 2003, p.132). The investment in people through education, health, and social services has also mitigated the challenges of shifting away from manufacturing towards a knowledge-based economy (GII, 2014; Hafkin & Huyer, 2006). This is not to imply that the distribution of benefits from innovation has been equitable across social class; historically the distribution of benefits has also been asymmetrical (Bourne, 2010). Oftentimes workers have borne the cost of innovation through job loss due to technological change and scientific advancement, resulting in higher levels of income inequality (Pianta &

Vivarelli, 2000). It is the responsibility of government to reduce the asymmetrical distribution of benefits, and to use innovation as a modality to create prosperity. Investing in product and service innovations that create jobs, and supporting the educational opportunities for workers to access these jobs, is critical to rebalancing the distribution of wealth (Hudson, 2012).

In Canada, more attention is paid to the role of natural resources in creating and sustaining wealth than to the relationship between innovation and quality of life, a relation which is embedded in the Swedish innovation discourse (Hawkins, 2012). The relatively small size of the Swedish business market, along with limited reserve of natural resources, has created a sense of urgency around innovation, more so than in the Canadian case (Benner, 2003, 2012). Innovation can bring transformative change to society, including medical advancements in diagnosis and treatment, new products and services, new modes of production, environmental protection, and technological change (Eggers & Macmillan, 2013). Innovation is increasingly paired with economic and environmental sustainability (Etzkowitz & Zhou, 2006; Fox & Pearson, 2008). However, the benefits of innovation should be balanced within the risks inherent in many aspects of the innovation process. Innovation can produce creative destruction; as some ideas and technologies replace others, new jobs and sectors are created, while other industries and ways of life may be displaced (Lundvall, 2010). Not all innovations are positive, and the negative social and economic impacts of the unintended consequences of innovation are often minimized within innovation research (Sveiby, Gripenberg, & Segercrantz, 2012).

Comparative innovation research has a tradition of being functionalist rather than critical in nature. This functionalism is manifested by focusing on variations of industrial inputs and changes in technology and process, rather than on the human side of innovation (Nelson, 1993). Changing levels of R&D funding, tax incentives for startup companies, and other inputs are measured by the OECD as drivers of innovation (Frascati Manual, 2002; Oslo Manual, 2005). However, innovation is equally about people. The way that people work together, share information, and organize labour within the economy determines who benefits from innovation (Andersson et al., 2012). Rarely are the assumptions that underpin innovation policy-making questioned from the perspective of gender equality. Gender equality is an ongoing process, whereby gender inequalities are problematized and addressed (Bacchi, 1999). The presence of gender inequalities in innovation policy in Canada and the OECD have not been problematized in the same way as in the Swedish case. Diverse perspectives are essential to creating the type of vibrant, creative economies where innovations flourish. Research indicates that diverse groups of leaders are more effective and innovative (Parrotta, Pozzoli, & Pytlikova, 2014; Torchia, 2013; Torchia, Calibre, & Huse, 2011). In addition, diversity in leadership encourages excellence and economic competitiveness by attracting the best employees at the organizational and regional level (Bird & Jackson, 2014; Cukier et al., 2012; Cukier et al., 2013; Cukier et al., 2014). Diverse groups are also more likely to support corporate social responsibility within their communities (Bear, Rahman, & Post, 2009). The relationship between diversity and gender equality are explored throughout the dissertation from the

perspective of intersectionality, and the contribution of life experience to innovation work.

The purpose of this study is to explain the variation in approaches to gender equality and innovation in Canada vs. Sweden through the study of policy, performance measurement, and resource allocation. This study challenges assumptions about the social and economic power dynamics reflected in current innovation policies through the theoretical lens of feminist institutionalism (Acker, 1992; Chappell, 2002; Chappell & Waylen, 2013; Grace, 2011; Gray, 2010; Krook & Mackay, 2011; Stivers, 2002).

Feminist-informed research is often “versed in multiple theoretical frameworks in order to enable the researcher to ‘see’ those people and processes lost in gaps, silences, margins, and peripheries” (Ackerly & True, 2010, p. 22). Thus this dissertation is interdisciplinary in that it draws on the body of literature on innovation, entrepreneurship and science and technology, as well as political science to, make visible the gaps in equality in innovation policy. A significant body of work explains the factors that prevent women from achieving equality in the fields of science, technology, engineering and mathematics (STEM) at different stages on the career path (Etzkowitz, Kemelgor, & Uzzi, 2000; Etzkowitz et al., 1994; Etzkowitz & Gupta, 2006; Etzkowitz & Ranga, 2011; Glass et al., 2013; Hango, 2013; Ranga & Etzkowitz, 2010). Entrepreneurship literature has also to a great extent illustrated the ways in which gender influences, choices, experiences, and outcomes of self-employment (Ahl, 2006; Coleman & Robb, 2012; Ezzedeen & Zikic, 2012; Hughes, 2010; Hughes & Jennings, 2012; Kariv, 2013; Orser, Elliott, & Leck,

2013. Both of these literatures contribute to the understanding of how gendered institutions frame the substantive and constructive representation of women in innovation policy, by government, and as innovators in academia and the private sector (Kantola & Squires, 2012; Squires, 2004; 2008).

The empirical focus of the study is national innovation policy in Sweden and Canada from 2012 to 2014. The period from 2012 to 2014 is the focal point for this analysis because it was a time of substantive change for Swedish innovation policy: The Swedish Ministry of Enterprise, Energy and Communications released the Swedish Innovation Strategy 2012. At the same time, the Canadian government sponsored the Jenkins Report, formally titled Innovation Canada: A Call to Action. This expert panel was commissioned to provide advice on the future direction of innovation policy and ignite debate on new directions (Jenkins, 2011). The time period for the study provides an interesting contrast in cases. A number of key reports were also produced by the OECD on both Canada and Sweden's approaches to innovation during this time period. The reports include the OECD Reviews of Innovation Policy: Sweden 2012 and OECD Science Technology and Industry Outlook: Canada, 2012. In 2012, the OECD also conducted a major review of gender equality titled Closing the Gender Gap: Act Now, where issues of women's entrepreneurship and innovation were explicitly considered. The research activity on innovation and gender equality provided a focal point for the qualitative interviews in Canada, Sweden, and the OECD. These documents provide a framework to raise questions of gender equality in innovation from an academic

perspective, and serve as a point of contrast to interview data. From a practitioner perspective, this research challenges leaders to question existing innovation policy norms and invest in diversity and gender equality in innovation policy, performance measurement, and resource allocation.

### **Research Questions**

There are five key research questions that inform this study, each focusing on a different level of analysis. These research questions incorporate the global dimension of innovation policy, while connecting individual experiences to national and international policy debates.

- 1) How do Organization for Economic Cooperation and Development (OECD) innovation norms influence the inclusion of women in innovation policy at the national level in Canada and Sweden?
- 2) Do existing theories of innovation explain women's experiences as innovators and entrepreneurs within national innovation systems?
- 3) How can the obstacles to women's full participation in national innovation systems be overcome?
- 4) What is the unique contribution that women's engagement in innovation policy can make to economic prosperity in a global knowledge economy?
- 5) How do Sweden and Canada differ in the incorporation of gendered approaches to innovation policy?

The first question focuses on policy learning and the transfer of knowledge on gender equality and innovation across OECD member states (Mahon, 2008; Mahon & McBride, 2008; Woodward, 2009). The second research question is interdisciplinary in nature, drawing on the gender quality and entrepreneurship literature; it is a hypothesis to be tested that inclusion differs in entrepreneurship and innovation spaces (Ahl, 2006;

Coleman & Robb, 2012; Ezzedeen & Zikic, 2012; Hughes, 2010; Hughes & Jennings, 2012; Kariv, 2013; Orser, Elliott, & Leck, 2013).

The third question focuses on explaining substantive and constructive representation of women in innovation spaces (Kantola & Squires, 2012; Kenworthy & Malami, 1999; Squires, 2004; 2008) This question explores the co-construction of masculinities and femininities in innovation spaces (Andersson et al., 2012; Lindberg, 2012). Research demonstrates that a gender-conscious approach to science, technology, engineering, mathematics, and medicine contributes to innovation (Schiebinger, 2008; 2011; Schiebinger & Klinge, 2013; Schiebinger & Schraudner, 2011). As well, women's access to information and communication technology is a growing driver of economic and social development in many parts of the world (Hafkin & Huyer, 2008; Huyer, 2015). The fourth question extends this line of inquiry to the policy domain by considering how a gender-conscious approach might contribute to the development of innovation policy.

This is the first study of its kind to make an in-depth comparison of gender equality and innovation in Canada and Sweden. The fifth question uses the feminist institutionalist approach to focus on policy learning derived from differences observed across cases (Acker, 1992; Chappell, 2002; Chappell & Waylen, 2013; Grace, 2011; Gray, 2010; Krook & Mackay, 2011; Stivers, 2002). The differences between Canada and Sweden that contribute to the case selection are the differences in political systems (Andersson et al., 2012; Creutzberg, 2011; Hawkins, 2012; Yi, 2006) and the historical development of industries that shape the economics of innovation in Canada and Sweden

(Edquist & Hommen, 2008; Hawkins, 2012; Nelson, 1993), as well as, the differences in welfare state systems that support innovation (Esping-Andersen, 2002; Hughes & Jennings, 2012; Korpi, 2010; Mahon, 1999). These questions are answered differently on the topics of policy, performance measurement, and resources allocation.

### **Definition of Key Terms**

The definitions of gender and innovation are debated throughout the literature. These terms influence the theoretical and practical understanding of gender equality, and the relationship to innovation throughout this study. The definition of gender is debated within the literature; however, there is consensus that it is understood to be separate from that of biological sex (Acker, 1992; Butler, 1990). In the gender and innovation literature, it is accepted that gender is socially constructed through interaction: “gender is not a set of traits, nor a variable, nor a role, but the product of social doings of some sort” (West & Zimmerman, 1987, p. 129). This distinction is important in the feminist literature as well as the research on scientific innovation (Andersson et al., 2012; Butler, 1990; Krook, 2010; Richardson, 2008; Schiebinger, 2008; Squires, 2008). In the area of scientific innovation, the study of human genetics contributes to a more nuanced understanding of biological sex similarities and differences as well as the potential implications for medical research (Richardson, 2008).

In political science, research has moved away from the binary of biological sex differences as a credible ground for differentiating the goals, objectives, and capacity of political actors within institutions (Acker, 1992; Krook, 2010; Mackay, Kenny, &

Chappell, 2010; Squires; 2008). The shift to gender, rather than biological sex, as a unit of analysis, facilitates the study of masculinities and femininities in political spaces (Acker, 1992; Andersson et al., 2012; Krook, 2010; Lindberg, Danilda, & Torstensson, 2012). A gender lens opens up analytical space to assess the power relationships that manifest from a continuum of similarity and difference, rather than focusing on a one-dimensional representation of women (Krook, 2010). The term “intersectionality” is frequently used in the literature to emphasize that gender is one aspect of identity that may be expressed differently in varying historical and cultural contexts, and cannot be separated from race, class, ethnic, sexual, and regional identities (Butler, 1990). There are a number of ways that class, race, gender, and age can intersect, and produce multiplicative effects and intersectional effects separate from one another (Weldon, 2006). Intersectionality in this study facilitates research that moves past the fault of oversimplification, while recognizing that identities are differently shaped by institutions and women’s experience within social structures. It is recognized that women, as a categorical group, are complex and heterogeneous, and their life experiences are informed by differences of race, class, ethnicity, nationality, generation, and religion (Berkovitch & Moghadam, 1999). There are many challenges to employing measures of identity and capturing experiences that go beyond sex-segregated statistics, in order to make sense of how the masculine and feminine are performed within institutions (Chappell, 2002; Orloff, 1993, 2009; Tripp, 2006; Weldon, 2006). One way to address these challenges is to ensure that structural

analysis is employed in the study of intersectionality: “It is the intersection of social structures, not identities, to which the concept refers” (Acker, 1992; Tripp, 2006, p. 239).

In the innovation literature, biological sex appears more frequently; assumptions about sex differences that favour male models of genetic sex determination have historically shaped scientific discovery (Fausto-Sterling, 1989; Richardson, 2008; 2013). Male bias has resulted in fewer medical innovations that specifically advance the health of women and intersex people (Richardson, 2008). Richardson (2008) explains that feminist critiques have positively influenced the evolution of sex determination genetics as a field by normalizing gender-conscious practices (Fausto-Sterling, 1989). Feminist critiques, although often unrecognized in mainstream science publications, have shifted genetic research away from a binary male and female model, to a continuum inclusive of intersex characteristics (Richardson, 2008, 2013; Schiebinger, 2008). This has opened up scientific spaces for gender-inclusive innovation, particularly in the fields of science, health, medicine, and engineering (Richardson, 2008, 2013; Schiebinger, 2008, 2011; Schiebinger & Klinge, 2013).

### **Innovation and National Innovation Systems**

One of the main contributions of the field of gender and innovation studies is challenging existing concepts and definitions of innovation to open new avenues of inquiry in the literature (Andersson et al., 2012). The concepts of invention and innovation are separate from each other: invention is the act of producing a new idea, product, or service, while innovation requires moving the invention towards

implementation (Archibugi & Filippetti, 2015). Innovation takes place within national innovation systems through processes of industrialization and learning (Edquist & Lundvall 1993; Freeman, 1995; Lundvall, 2010). Inventions tailored to solving problems of a domestic nature, such as those relating to sewing, cooking, childcare, and nursing, are often labelled as less prestigious than those which solve problems that arise outside of the home (Macdonald, 1992). This pattern of gendered hierarchy of inventions has continued into the domain of innovation and the gender patterns of learning that take place in national innovation systems (Macdonald, 1992; Thelen, 2003, 2004; Waylen, 2011). There continues to be a division between innovations that fit within established expectations that innovations are technological, scientific, and have high growth potential, institutions such as universities are designed to support such forms of innovation. In contrast, domestic innovations or those innovations related to caring professions are often developed outside of existing institutional structures. Thus, reinforcing divisions between innovations that have a gendered connotation.

In practice, the OECD defines innovation as the implementation (in contrast to invention) of a new or significantly improved product, good or service or process, a new marketing method, or a new organizational method in business practices, workplace organization or external relations (Oslo Manual, 2005). The OECD definition is consistent with the notion that innovation normally has commercial value. In the gender and innovation literature, there is a growing shift away from early linear models of

innovation that suggest innovations must have commercial value and reach the free market to qualify under the umbrella of innovation (Bush, 1945; Schumpeter, 1942).

Feminist innovation scholars challenge the openness of innovation systems and seek to dislodge the “natural order” of thinking about and constructing innovation (Andersson et al., 2012; Danilda & Thorslund, 2011). Expanding the industries and locations in which innovation may take place is in itself innovative, and thus a gender perspective “benefits all those interested in promoting innovation irrespective of position, gender, and industry” (Andersson et al., 2012, p. 15). The gender approach to innovation is consistent with the narrative of work on national innovation systems that suggests that “innovations are not rare acts of an individual, but ubiquitous and the outcome of interaction among individuals and organizations” (Johnson & Lundvall, 2013, p. 1341). The expansion of the definition of innovation in recent years has also grown to include the public sector and social innovation. The OECD defines public sector innovation through the use of technological innovations such as e-government to provide better public service delivery and achieve policy goals (OECD Public Sector Innovation). Scholarship complicates this understanding of public sector innovation by challenging the ability to measure public sector innovation across time and space (Kattel et al., 2013). Finally, social innovation is also growing in importance, and often exists outside of the mainstream innovation discourse (Lindeberg, Danilda, & Torstensson, 2012). Generating non-market innovations that transform the negative social and environmental externalities of technological innovation into positive outcomes, is a process that disrupts current

innovation practices and norms (Nicholls & Murdock, 2012). However even in the process of creating social innovation, gender inequality is rarely mainstreamed into the process of resolving negative externalities (Bedell, 2014). The OECD defines social innovation as a group of strategies, concepts, ideas and organizational patterns intended to expand and strengthen the role of innovation in response to the diversity of social needs, which may include education, culture and health (OECD, 2011). The gender and innovation scholarship seeks to dislodge the primacy of technology across all forms of innovation, to include a wider view of “newness” that contributes to the field of innovation but is not necessarily technologically driven (Andersson et al., 2012). Thus bridging the disruptive power of social innovation with traditional ways of thinking about technological innovation from a gender perspective.

### **Organization of the Dissertation**

This dissertation consists of seven chapters; the data chapters reflect the themes of policy, performance measurement, and resource allocation, respectively, that emerged from the qualitative interviews in Canada, Sweden, and the OECD.

Chapter 1: Introduction includes the Statement of the Problem and Purpose of the Study, the Research Questions, and Definition of Key Terms, and concludes with a brief outline of the chapters in the dissertation.

Chapter 2, Case Selection and Research Methodology, begins with the Conceptual and Theoretical Framework for the study, which frames the case selection and rationale

for the comparative case study of Canada and Sweden. The second chapter concludes with the Research Methods used for this study.

Chapter 3, Feminist Institutionalism and The Triple Helix Model, explores the theoretical framework for the dissertation. This chapter situates the study within the triple helix model in the innovation literature and contemporary feminist institutionalism in political science. The chapter is organized according to the strands of the triple helix model: theories of feminist institutionalism in government, industry, and academia are discussed. Intersectionality of institutions establishes the framework for discussions of representation in the data chapters.

Chapter 4, National Governments and Gendered Innovation Policy, is dedicated to exploring the difference in approaches to gender equality and innovation policy in Canada and Sweden. The chapter begins with a brief history of the development of national innovation systems in Canada and Sweden, followed by a discussion of the politics of innovation policy in both cases. The second half of the chapter focuses on the different approaches to gender equality and innovation policy in Canada and Sweden, as well as the transnational dimension of policy learning through interactions with the OECD. The chapter concludes with a section on policy recommendations.

Chapter 5, Measuring the Performance of Innovation Systems with A Gender Lens, takes an expansive view of performance measurement. This chapter discusses formal and informal performance measures. The chapter begins with a history of women in Canada and Sweden as innovators, followed by a discussion of the role of stereotypes

that influence performance measurement. The chapter also includes a section on women's leadership and the connection between board diversity and innovation. The chapter concludes with recommendations for gender-conscious performance measurement.

Chapter 6, Supporting Innovation: Resources and Gender Equality, explains how different approaches to allocating monetary and non-monetary resources support gender equality and innovation. The first section addresses traditional measures of innovation, including R&D Spending in the OECD. The body of the chapter is divided into Public Sector Support for Innovation in Canada and Sweden and Private Capital and Innovation Finance in Canada and Sweden. The chapter concludes with Beyond Finance: Social Networks and Mentorship as well as resource allocation recommendations.

Chapter 7, Conclusion: Designing Equality of Opportunity, begins with a Summary of the dissertation and a discussion of the Contribution to Knowledge and the Limitations of the Research. The dissertation concludes with a discussion of Opportunities for Further Research and a section on the Implications for Policy and Practice.

## **CHAPTER 2**

### **CHAPTER 2: Case Selection and Research Methodology**

#### **Introduction**

What makes some countries more innovative than others? Who leads and who falls behind? This is a complex question with no clear answer. Innovation policy is a nascent field with considerable scope for cross-jurisdictional policy learning. This case study explores how Canada and Sweden approach the role of gender equality in innovation differently, and establishes the comparative framework for the study. This chapter builds on the purpose of the study elaborated in the Introduction and begins with the definition of key terms in the field of innovation. The definition of key terms is drawn from OECD documents and represents a shared understanding of innovation in Canada and Sweden. The case selection establishes an empirical understanding of the role that institutions play in shaping women's participation in innovation. The Swedish government has drafted two national innovation strategies, the first in 2004, and the most recent in 2012. In 2014, the Canadian government had not tabled a singular national innovation strategy, but rather a variety of policies in different departments with the mandate of addressing innovation. Federal responsibility for innovation is housed in Industry Canada; however, there are several other federal agencies, such as the Social Sciences and Humanities Research Council (SSHRC), Natural Sciences and Engineering Research Council of Canada (NSERC), and the Canadian Institute for Health Research

(CIHR), which have research funding responsibility similar to the Swedish innovation agency Vinnova. Vinnova differs from the Canadian granting agencies in several important ways. Vinnova provides a single point of contact for innovation funding and programs, which allows for synergies to develop across institutional boundaries, furthering Sweden's innovation capacity. In addition, Vinnova has a mandate to conduct performance measurement for funding programs, which further strengthens institutional learning from innovation projects in a variety of sectors across the Swedish economy. The presence of Vinnova provides another important point of comparison in the case study, and the role of the agency is relevant in the exploration of policy, performance measurement, and resources allocation. Internationally, the European Union has taken a key leadership role in developing a knowledge base and set of best practices for increasing the number of women in innovation work through the Horizon 2020 program, which launched in 2014. The EU is facing high unemployment in many sectors of the economy and a simultaneous shortage of highly skilled workers in fields such as information and communication technology (ICT) and computer science (EU Commission, 2014). Innovation is an important aspect of the EU's strategy for economic growth following the recent financial crisis (Archibugi, Filippetti, & Frenz, 2013). A key aspect of the EU's approach to innovation is to consider the gendered implications of EU innovation policy to maximize the use of talented men and women educated within the European Union to fill ICT skills gaps and spark entrepreneurial ventures. Outside of the EU, gender mainstreaming in innovation has not yet been adopted internationally by the

OECD. The OECD provides respected leadership to member countries including Canada and Sweden, as well as nonmember states, on innovation policy (Lundvall, 2010). Within the OECD, innovation and gender issues are housed in separate administrative units, and therefore these policy issues have not been coordinated to the same degree as in the EU. The European Commission has sponsored four Gender Summits, three in Brussels and one in Washington D.C. dedicated to discussing Quality Research and Innovation through Equality, with future events scheduled in Asia and Africa (EU Gender Summit, 2016). These events serve as a focal point for debate on the role of gender consciousness in scientific research, as well as the role of women working in science, technology, engineering, mathematics, and innovation more broadly. Speakers at the Gender Summits representing the European Union, national governments and research institutions have demonstrated a high level of political support for challenging the status quo. The Gender Summits have raised awareness of the varied effects that the imbalance in women's participation in innovation has on the current quality of scientific research and business innovation throughout Europe. Canadian government representatives have attended Gender Summits, yet as a country outside of the EU framework of institutions, Canada has made no policy commitment comparable to the Horizon 2020 program.

There is no academic research available on how Canada compares to EU member countries in the field of women and innovation policy. For practical reasons, a comparison of Canada and each of the EU member states is outside the scope of this dissertation . Therefore, an alternative approach has been selected to compare Canada with Sweden, the

most innovative country within the EU, and the most progressive in the creation and implementation of gender-conscious innovation policy (Danilda & Thorslund, 2011; EU Commission, 2014). This study also builds on the historical tradition of innovation policy leadership within the OECD. The OECD is included, to illuminate the shared norms that underpin innovation policy in Canada and Sweden (Frascati Manual, 2002; Oslo Manual, 2005). Canada and Sweden have different institutional approaches to innovation, yet OECD innovation research and evaluation are important reference points in the policy trajectories pursued across cases. This chapter concludes with a discussion of the research methods used to undertake the qualitative interviews and document analysis across Canada and Sweden, and in selected directorates within the OECD.

### **Conceptual and Theoretical Framework**

The conceptual and theoretical framework for this study integrates the triple helix innovation theory, and feminist institutionalism in political science, to explore gender absence in innovation policy in Canada in contrast to gender inclusion in Sweden. Innovation policy is broadly defined as the government commitment to generating new ideas, technologies, and industries that contribute to economic growth and a higher quality of life (Oslo Manual, 2005). A commitment to generating “newness” is a distinctive feature of innovation policy. Within this broad category, innovation policy may also include objectives such as job creation, environmental protection, and social cohesion (Berglund & Thorslund, 2012). Historically, innovation policy has focused on research and development guided by the linear model of innovation. This model of

innovation proposes that research conducted in a university setting is transferred to the private sector, where product development and commercialization of the innovation take place (Bush 1945; Carayannis & Campbell, 2009). The linear model has informed government decision making on innovation policy for decades. Critics of the linear model argue that the smooth transition from pure science to applied research and commercialization has never existed except in theory (Godin, 2006). The path to innovation is far more complex than this construct implies. The connection between innovation policy and the linear model of innovation may be the single greatest factor constraining innovation in the modern economy. In the United States and the OECD in particular, the linear model of innovation has become a social fact which all other models must attempt to dislodge, even though there is little practical evidence to suggest that this model is functional within the economy (Godin, 2006).

The linear model of innovation is the foundation from which other theories of innovation have been built (Godin, 2006, p. 639). Several helix models, named after the double helix of human genetic material (DNA), have emerged in response to the limitations of the one-directional flow of information in the linear model. The helix models emphasize the dynamic flow of information, and the presence of resources in different strands of the economy that create an environment conducive to innovation. The dominant theoretical model that informs innovation policy in Canada and Sweden is the triple helix model. The triple helix postulates that the dynamic flow of information and resources among government, academia, and industry create the conditions necessary to

innovate. The foundation of the triple helix model is that governments have the power to create innovation by providing tax incentives to corporations to set up research facilities, or provide grants for basic and applied scientific research to academic institutions (Carayannis & Campbell, 2009). Critics of the triple helix model point to some of the theoretical challenges inherent in confining innovation to established institutions. Corporate elites, academics, and government officials often share similar educational and life experiences, which may reinforce traditional patterns of thought that run counter to the development of innovative thinking (Lindberg, 2012). In addition, as innovation systems become entrenched, academic institutions and corporations may come to rely on government research funding, even if they are not producing innovative results.

Innovation policy has been particularly resistant to gendering and identity politics for a number of reasons. The construction of who is an actor within the domain has shaped policy objectives: “Still, entrepreneurship research has not paid so much attention to the many people who are working together to produce and diffuse ‘newness,’ but has instead helped construct the entrepreneur as an almost superhuman masculine being” (Bacchi, 1999; Berglund & Thorslund, 2012, p. 30). This construct of masculine entrepreneurship is important in understanding who is included and excluded from innovation discourse (Ahl, 2004). In Scandinavia, women are more likely to be employed in the non-profit sector than in private corporations, and contribute to innovation through these organizations rather than through entrepreneurial ventures alone (Statistics Sweden, 2014). As a result, an alternative quadruple helix model has been proposed to reflect the

gendered role of non-profits in the innovation process. The inclusion of NGOs in the quadruple helix theoretically expands the model, and is gender-conscious (Lindberg, 2007; Lindberg & Lindgren, 2010). However, research on the quadruple helix and gender equality is primarily through participatory action research that purposively seeks out and includes NGOs in innovation processes (Lindberg, 2007; Lindberg & Lindgren, 2010). Thus the model is confined to very specific types of innovation projects, unlike the triple helix formation, which is dominant in a larger network of innovation spaces.

The institutions that facilitate innovation are built on the principles of merit and the pursuit of excellence. Using a feminist institutionalist perspective to understand bureaucratic norms, values, and resource allocation demonstrates that bureaucracies at the local, provincial, and national levels are both gendered and dominated by masculine values (Chappell, 2002; Phillips, 1996; Stivers, 2002). Innovation is both a top-down and bottom-up process. Historically, innovation research has emphasized the value of corporate knowledge and leadership through investment in research and development (Bush, 1945; Schumpeter, 1942). More recently, innovation research has begun to focus on democratization of ideas and pluralism of knowledge, recognizing that access to innovation systems is a form of social power (Lindberg, 2007, 2010; Lindberg & Danilda, & Torstensson, 2012; Lindberg & Udén 2010; von Hippel, 2005). This section maps the key concepts in feminist institutionalism, and the triple helix innovation theory which form the basis of the case selection.

The literature on women and innovation in Canada is limited, and comparative case study research offers the opportunity to expand the theoretical and empirical understanding of gender in innovation spaces by comparing and contrasting documents and literature in Canada and Sweden. Cross-national comparison has become an essential part of feminist scholarship both because it is of academic interest, and because of the emancipatory possibilities that come from learning how women in other parts of the world advance women's rights and foster empowerment. In addition, cross-national research has created space for women to be compared to other women rather than continually comparing women to men within the same national context (Beckwith, 2000). Cross-national research has also legitimized feminist claims, and introduced feminist perspectives to many areas of political importance including the welfare state, public administration, and foreign policy. There is a tradition of cross-national comparison in innovation policy within Scandinavia, including Sweden, Finland, Norway, and Denmark. This cross-national comparative case study extends the gender, and innovation policy research from Scandinavia to North America by comparing Canada and Sweden.

One of the greatest challenges in this study is to better reflect actual experiences of individuals and groups in academic research. One of the ways this challenge is addressed is through the inclusion of qualitative interviews in the research methodology. Theoretically, the challenge of recognizing intra-group differences has given rise to the concept of intersectionality as a framework for studying identity. However, "It is not often recognized that structural analysis is required by the idea of intersectionality: It is the

intersection of social structures, not identities, to which the concept refers” (Tripp, 2006, p. 239). The theoretical concept of intersectionality is useful in interpreting the experiences of leaders in the sampling frame, including the government, industry, and academic institutions that form the foundation of the triple helix model. There are a number of ways in which class, race, gender, and age can intersect and produce multiplicative and intersectional effects separate from one another (Weldon, 2006).

Intersectionality in this study facilitates research that moves past the fault of oversimplification, while recognizing that identities are differently shaped by institutions, and by women’s experience within social structures. As many feminist scholars have demonstrated in their work, there are many challenges to employing measures of identity to capture experiences that go beyond biological sex, and to make sense of how the masculine, and feminine are performed within institutions (Chappell, 2002; Orloff, 1993, 2009; Tripp, 2006; Weldon, 2006). In the study of women and innovation, it is necessary to begin from the theoretical premise of intersectionality; this begins with the understanding that “women” as a category of research is of necessity complex, heterogeneous, and informed by differences of race, class, ethnicity, nationality, generation, and religion (Berkovitch & Moghadam, 1999). For these reasons it is important to consider the generalizability of the insights from the case study, while recognizing the limitations of the findings due to the specific nature of the sample frame (Beckwith, 2000). However, despite these challenges, there are real benefits to

considering gender as a variable in innovation policy cross-nationally and across time (Tripp, 2006).

### **Case Selection**

Gender and public policy literature in Canada has addressed many important policy issues that impact women's lives, including childcare, pay equity, and women's political representation (Bashevkin, 2009; Hallgrimsdottir et al., 2013; McNutt, 2010). However, the gender and public policy literature has not focused as intently on how women are represented in policy portfolios that are widely considered to be gender-neutral. Portfolios such as technology, business, and innovation are rarely examined from a gender perspective by political scientists and policy makers (Crowden, 2003; Orser et al., 2013; Pouragheli & Beckton, 2013). The absence of a gender perspective on many of the policy agendas that drive the growth and economic well-being of the nation is a disservice to women in Canada. Innovation policy is a particularly interesting case study for the representation of women in non-traditional policy spheres because it lies at the intersection of technology, business, science, engineering, medicine, and creative industries, all fields where women are achieving high levels of post-secondary education yet failing to achieve upward career mobility at the same rates as their male counterparts (Alsos, Ljunggren & Hytti, 2013; Canadian Council of Academies, 2012; Layne et al., 2010).

Innovation policy is rapidly evolving in Canada at the federal and provincial levels, and it is thus an ideal time to examine how existing policies and institutions are

setting the course for women's inclusion or exclusion in the next generation of employment and labour market growth within the knowledge economy (Hafkin & Huyer, 2006). Women's entrepreneurship has increased in Canada by 200% in the last 20 years, yet only 6% of technology-based start ups are led by women; there is tremendous potential for growth within the technology and innovation space for women to develop ideas and content (Souha & Zikic, 2012). In a fieldwork interview, a Swedish government official commented that if women engaged in entrepreneurship at the same rate as Swedish men, 75,000 new businesses would open within the country.

Entrepreneurial ventures are not necessarily innovative, however innovation often requires entrepreneurship and thus it is an interesting proxy measure for the scale of women's involvement in innovation. These ventures could result in excess of 75,000 new jobs in Sweden, when future employees and spinoff ventures are considered. Studying the issue of women and innovation from a comparative perspective with Sweden invites an analysis that looks at the differences in institutional dynamics that influence gender equality and participation in innovation work in a different political, social, and economic context. In the domain of women and innovation policy, Sweden is a crucial case, as Gerring asserts; cases are rightly chosen for reasons of analytic utility: "When this governs case selection in a small-N sample we are identifying *crucial* cases—cases that are, for one reason or another, critical to a concept or to a broader body of theory" (Gerring, 2001, p. 219). The depth of scholarship on women and innovation originating from Sweden is the most developed in the world (Andersson et al., 2012). In

combination with the inclusion of gender in national innovation policy, studying Sweden is instrumental to understanding the field as a whole (Alsos, Ljunggren, & Hytti, 2013). The inclusion of comparative data and interviews from the OECD is imperative to the cross-national comparison, as well as to setting the cases within the larger context of innovation internationally.

### ***Political Systems and Innovation Policy***

The case selection for this study of Canada and Sweden relies on a most different systems design (Otner, 2010). The political system in Sweden differs from that of Canada in a number of significant ways that influence the innovation policy trajectories taken by each country. Because Sweden is a unitary state, the regional dynamics of its innovation policy differ from those produced by the federal system in Canada. Innovation policy is the responsibility of the national government in Sweden. However, the Swedish state is the most decentralized of the Nordic countries; the municipal and county councils have considerable autonomy, which requires active consultation and communication for successful policy implementation at all levels throughout the country (Yi, 2006). In contrast, the division of responsibilities between the federal and provincial governments in Canada has hindered the development of a cohesive national innovation strategy. Canadian provinces have jurisdiction and autonomy sufficient to pursue separate innovation strategies to the federal government. They may at times be complementary or overlapping: “Though there has been no national innovation policy per se, over the years both federal and provincial governments have developed, in a largely uncoordinated

manner, a broad mix of policies administered through an equally broad range of departments and agencies targeting, directly or indirectly, one of the many facets of the innovation process” (Creutzberg, 2011, p. 4). The case selection for this study focuses on policy at the national level, yet it is important to contextualize the development of national policy decisions within the political system.

Sweden is the first of the Nordic countries to explicitly target gender equality as an objective of innovation policy, (Lindberg, 2007, 2010; Lindberg, Danilda, & Torstensson, 2012; Lindberg, & Lindgren, 2010; Lindberg & Udén, 2010). The inclusion of gender equality in the mission of the Swedish national innovation agency creates an analysis of different systems, surprisingly with similar challenges and outcomes as the Canadian case. Canada is without a gender-conscious innovation policy while Sweden has such a policy, yet the data from qualitative interviews demonstrates that many of the challenges that exist for women in innovation have not been overcome through current policy initiatives (Pettersson, 2007). For the last 20 years, the Swedish government, academic community, and private sector have actively engaged in a debate about what the inclusion of women in innovation should look like in Sweden through jointly funded research projects and publications. The most recent study is an edited book published in 2012 by Vinnova, titled *Promoting Innovation Policies, Practices and Procedures*. The book looks systematically at a number of sectors as well as regions in Sweden to create a body of knowledge around best practices in gender equality across a variety of industries and sites of innovation (Andersson et al., 2012).

In Canada, innovation policy is growing in importance as a policy domain, and considerable attention has been placed in recent years on charting a course for innovation and technology policy through expert panels and public consultation processes (Creutzberg, 2011; Jenkins, 2011). The Canadian economy is heavily dependent on a rich supply of natural resources, and thus innovation policy has not received as much attention from the federal government over the last 20 years as it has in Sweden (Hawkins, 2012). However, in 2010 the Canadian government requested a complete review of federal government support for research and development. The report that was produced in response to the 2010 federal budget request was unofficially referred to as the Jenkins Report, in reference to the panel chair Tom Jenkins and officially titled *Innovation Canada: A Call to Action*. The final report issued by the expert committee is the most comprehensive review of Canada's innovation strategy to date. The Jenkins Report provides a number of important policy recommendations for the federal government, including simplifying access to research and development funding and having a greater role for the federal government in supporting small and medium sized businesses in Canada. However, nowhere in the report was the issue of gender equality raised as a matter of scientific excellence and economic competitiveness. In contrast to Sweden, where a significant body of academic literature has addressed issues of women and innovation, in Canada only two works to date have been published at the Master's thesis level that address these issues (Crowden, 2003; Pouragheli & Beckton, 2013).

The policy leadership demonstrated by the national government on innovation in Sweden sets the country apart from Canada. In addition, the unitary state structure is more conducive to unified policy direction, in contrast to the competing trajectories between federal and provincial governments in Canada.

### ***Economics of Innovation Canada and Sweden***

The historical development of innovation policy is grounded in the agricultural and industrial development of the state. Historically, Sweden was primarily an agrarian society until the latter half of the 19th century, and the late industrial economy was founded on the processing and export of forestry and mineral products (Edquist & Hommen, 2008). Forestry and mining contributed to the development of the engineering industry, and by the 1950s, after a period of rapid industrialization, the United States was the only country in the OECD that had a larger share of engineering exports than Sweden (Edquist & Hommen, 2008). In the 1980s and 1990s, a greater share of Swedish exports grew to include communication technology and pharmaceuticals, leading the shift away from manufacturing to knowledge-based industries. Innovation in Sweden has been far more concentrated in the growth and development of a small number of large multinational enterprises (MNEs) which developed in Sweden during the 1950s and 1960s in comparison to small and medium sized enterprises (SMEs) (Nelson, 1993). In contrast, innovation in Canada is more diffuse and less R&D-intensive. The most economically significant sectors in Canada, such as natural resource extraction and financial services, are capital-intensive rather than R&D-intensive (Hawkins, 2012). In

addition, the development of SMEs over MNEs creates a different innovation profile than the Swedish case (Nelson, 1993). The R&D-intensive approach pursued by the Swedish government is consistent with the way that the OECD measures innovation in the Oslo and Frascati Manuals, which contributes to Sweden's consistently high innovation ratings. Criticism of the OECD rankings suggests that the OECD has overemphasized the importance of technology-focused and R&D-intensive innovation strategies (Hawkins, 2012). Government investment in R&D is one aspect of innovation but not a complete picture; creating innovation includes government investment as well as entrepreneurship and social networks that form to bring information and resources together in novel patterns. The following paragraph explores some of the economic innovation measures used by the OECD and offers a comparative perspective on Canada and Sweden.

The OECD tracks comparative innovation measures of the digital economy that provide insight into current innovation indicators and spending priorities cross-nationally (OECD Data, 2014). Canada and Sweden excel in different aspects of innovation; in some respects Canada's strengths are Sweden's areas of opportunity to improve, and vice versa. One of Sweden's areas of competitive advantage is consistently investing a higher percentage of GDP on Research and Development (R&D) than the OECD average. In the period from 2000 to 2014, Sweden has spent from 3.9% to 3.3% of GDP on R&D. In the same period, Canadian investment in R&D has declined from a high of 1.8% in 2000 to 1.6% of GDP in 2014 (OECD Data, 2014). Sweden's higher degree of investment is reflected in a larger share of triadic patent families, patents which are internationally

significant (OECD Data, 2014). The pressures of globalization have brought into question Sweden's high rate of R&D investment and the domestic rate of return. The current challenge within the Swedish innovation strategy is to ensure that R&D investment grows businesses and results in innovative startups in Sweden rather than the commercialization of innovative ideas by subsidiaries of Swedish MNEs outside of the country (Edquist & Hommen, 2008). Canada's declining investment in R&D is problematic given the time lag between investment and the realization of outputs. Declining investment now may be felt in reduced innovation outputs in future generations.

Investment in R&D is just one aspect of national innovation systems; patterns of entrepreneurial activity provide a complementary perspective on the economic landscape. Entrepreneurial activity helps to turn R&D research into products and services with commercial value. Entrepreneurial activity outside of the university lab setting also contributes to innovation in a complementary fashion. However, those countries with the highest rates of self-employment in the OECD, such as Greece, Turkey, and Mexico, are not necessarily the most innovative. Entrepreneurship is a valuable part of an innovation ecosystem, particularly when other aspects of the system are well-supported. Entrepreneurship indicators are one of the types of OECD innovation indicators measured by gender. This section explores the entrepreneurial activity of men and women in Canada and Sweden in comparison to the OECD average. In an analysis of male entrepreneurs (self-employed without employees), Canada and Sweden fall slightly below the OECD average of 12.6% of the labour force: Canada is at 12.1% and Sweden is at

8.7% (OECD Data, 2015). Canada is above the OECD average of 5.8% of men self-employed with employees, at 6.5%, and Sweden falls slightly below the OECD average at 5.6% (OECD Data, 2015). In both Canada and Sweden, women have lower rates of entrepreneurship than their male counterparts. The OECD average for women who are self-employed without employees is 8.0% of the labour force; Canada is just above the OECD average at 8.7%, and Sweden has the fourth-lowest level of women's entrepreneurship in the OECD at 4.0% of the labor force (OECD Data, 2015). When employing others is taken into account, women comprise an even smaller share of the entrepreneurial labor force. The OECD average for women who are self-employed with employees is 2.3% of the labor force, in Sweden 1.7% of the labour force, and in Canada 2.6% of the labor force (OECD Data, 2015). These data indicate that in both countries entrepreneurship is a minority of labor force participation, and within each of these figures an even smaller percentage of entrepreneurial ventures invest in innovation. To put state investment in R&D and entrepreneurial activity into context, economic performance of the Canadian and Swedish economies is higher than the OECD average. In 2014, Canadian GDP per capita calculated in US dollars is \$44,319.10, and Swedish GDP per capita is \$45,813.50; the average for the OECD is \$38,937.50 (OECD Stat, 2014). The differences in R&D investment and entrepreneurship patterns establish the economic foundation for the comparative analysis.

***Welfare State Systems and Childcare: Supporting Innovation***

The final consideration for the case selection is the differences in welfare state models in Canada and Sweden. The configuration of the welfare state has a significant impact on the way that women work outside of the home. The incentives or disincentives to engage in innovation-related work, either through self-employment or employment in the public or private sector, is directly related to the costs and benefits of employment (Hughes & Jennings, 2012). As discussed in the previous section, OECD data indicate that women in Sweden engage in entrepreneurship at lower rates than women in Canada and elsewhere in the OECD. This finding sets up an interesting research puzzle given that self-employed women in Sweden have access to benefits that similarly employed women in Canada are denied. In Sweden, access to high quality state-funded childcare and parental leave are available to self-employed people on the same terms as those in salaried jobs, reducing some of the risks of self-employment compared to Canada (Hughes & Jennings, 2012; Mahon, 1999). Childcare in Canada is structured in line with the liberal welfare state; however, with distinct regional variations, overall childcare is left to family and market-based service providers. In Sweden, publicly funded childcare reflects the wider goals of the social democratic welfare state (Mahon, 1999).

In 2010, the Canadian government introduced a plan to allow self-employed Canadians to opt into employment insurance benefits (EI) including parental leave; however, very few people have enrolled in the program because the costs of enrolment are in many cases higher than the potential benefits (Service Canada, 2010). Similarly in

Sweden the benefits offered to self-employed women, while comparable to those in salaried positions, do not take into account the additional pressures of being self-employed and the costs associated with hiring replacement staff or the need to stay engaged in the business rather than stepping out on a full parental leave (Hughes & Jennings, 2012). In both cases, tailored benefits that reflect the needs and challenges of female entrepreneurs are unavailable. In Canada, self-employment may provide the flexibility necessary to balance work and family life, a balance that is easier struck in traditional employment in Sweden.

The Swedish social democratic welfare state has produced one of the most egalitarian societies in the world, yet there are still significant challenges for women and new immigrants in the work force. “In a stylized way, the Scandinavia-American contrast spells out one of the key dilemmas. We can, as in the Nordic countries, combine high female participation with high birth rates but at the cost of extraordinarily gender segregated employment” (Esping-Andersen, 2002, p.74; Squires, 2008). As Esping-Andersen observes, the policy decisions made by government to include women in the economy have had unintended consequences, which are illuminated in the study of women and innovation. “It is not difficult to see why ‘women friendly’ policy may inadvertently produce heavy gender segregation in labour markets. Leaves, high wages, part-time and public sector jobs all help reduce incompatibilities, but the consequences may be to intensify other inequalities such as job segregation” (Esping-Andersen, 2002, p. 86). The labour market segregation produced by the existing set of insurances and

benefits in different welfare state models is an important point of comparison in Canada and Sweden. Both countries have strong disincentives for women to become self-employed despite the different approaches to the institutional structure of the welfare state. Korpi (2010) explains the trajectory in the Nordic countries, dating back to the early 1970's, when left parties began to change the policies that governed work, leading to the creation of the dual-earner/dual-carer model (Korpi, 2010, p. 21). These policy changes were designed to increase women's full-time paid employment through the expansion of childcare programs for children, parental leave programs that encouraged mothers and fathers to care for children, and separate taxation of spouses (Korpi, 2010). In contrast to the dual-earner/dual-carer model, Canada is classified among the group of countries recognized as market-oriented welfare states (Korpi, 2010). The market-oriented model is prevalent in countries with centre-right parties; some examples include Canada, the United Kingdom, Australia and New Zealand (Korpi, 2010). In the market-oriented gender policy model, families are responsible for arranging childcare either with family members or in the private sector, rather than relying on state institutions for support (Korpi, 2010). The Swedish dual-earner/dual-carer model offers better opportunities to balance work and family life when women are employed full-time and part-time. From a comparative perspective, the social democratic welfare state in Sweden provides more support for women working outside of the home in comparison to the liberal model in Canada (Esping-Andersen, 2002). However, within-case variation demonstrates that the advantages of the social democratic welfare state are somewhat diminished when self-

employment is considered (Fairclough, 2012; Hughes & Jennings, 2012). A regression analysis using data from the Global Entrepreneurship Monitor Survey on individual employment choice and the World Economic Forum's Gender Gap analysis on institutional gender equality explains this relationship (Fairclough, 2012). There is a statistically significant correlation between institutionalized gender equality and low levels of women's self-employment (Fairclough, 2012). This effect is greater for women under the age of 50 (Fairclough, 2012). The correlation is explained by the presence of "women-friendly" policies, such as maternity leave, parental leave, and sick leave, in states with a high degree of gender equality (Fairclough, 2012). There is a higher opportunity cost for women to opt out of the benefits of traditional employment in a more gender equal society (Fairclough, 2012). This is an important policy consideration: The absence of the extension of "women-friendly" policies to self-employment is part of the gendered welfare state (Fairclough, 2012; Hughes & Jennings, 2012; Kariv, 2013; Sundin & Holmquist, 2013). Launching an entrepreneurial venture that includes self-employment may be necessary at some stage in the process of engaging in innovation-related work (Kariv, 2013; Sundin & Holmquist, 2013). The difference in welfare state models between Canada and Sweden is an important factor that underpins the comparative analysis and the utility of feminist institutionalism as an analytical frame.

## **Research Methods**

The research methods selected for this study include a thematic analysis of semi-structured elite interview data in contrast to relevant policy documents. The purpose of this study is to understand the relationship between national innovation policy, gender equality, and the opportunity for women to engage in innovation work in Canada and Sweden. To understand the relationship between innovation and gender equality it is necessary to compare and contrast formal policy documents with the knowledge of leaders in the field (Aberbach & Rockman, 2002). Goldstein (2002) argues that elite interviews have three purposes depending on the overall design of the research. Elite interviews are valuable insofar as they allow the researcher to make generalizable claims about all such officials' characteristics or decisions, assist in the discovery of particular documents or information, or inform the use of other types of data (Goldstein, 2002, p. 669). In this study, elite interviews serve the purpose of accessing specific information, about the informal practices pertinent to gender equality in national innovation systems, as well as providing context regarding the formal policy documents and reports included in the case study. In addition, insights from the interview data are generalizable to other similar cases. For this reason, it is important to select a sample that is highly knowledgeable about the organization they represent, and the organization's position within the broader context of innovation policy at the national level. Qualitative research may contribute significantly to understanding and framing policy, if only to increase the

range of policy options available, by making invisible norms visible (Chappell & Waylen, 2013). The knowledge of elite interview subjects provides unique insight into the inner workings of innovation systems (Olesen, 2008). Open-ended questions also provide the opportunity to gain insight into the attitudes, values, and beliefs of leaders across cases (Tansey, 2007). The sampling frame for this study is divided in three sections. Interview subjects are selected from each of the two cases Canada and Sweden as well as a sample of officials at the Organization for Economic Cooperation and Development. Within the sampling frame, elite interview subjects are selected from a nonrandom sample. The sample includes men and women who hold senior leadership positions in organizations that align with one of three strands of the triple helix model: government, industry and academia, presented in the table below.

<b>Government</b>	The public sector sample includes representatives from government agencies in Canada and Sweden as well as representatives from the OECD. This sample also includes leaders from public sector organizations that are wholly or partially funded by government, and operate at arm's length.
<b>Industry</b>	The private sector sample includes entrepreneurs, chief executive officers, and founders. This sample is intentionally broad to draw upon the expertise of leaders in a range of sectors to capture different vantage points and experiences in Canada and Sweden. The sectors sampled include the tech industry, automotive sector, and service innovation sector, as well as consultants that facilitate innovation.
<b>Academia</b>	The academic sample includes university-based researchers who teach and publish on innovation in Canada and Sweden. Representatives in this sample may also provide advice to their respective governments on innovation issues or participate in government, industry, and academic collaborations.

In total, 65 people were contacted to participate in interviews, and 44 people responded to the official request and sat for an interview. The participant response was strong, with 68% of the people contacted agreeing to participate in the research study. Every effort has been made to contact women in leadership positions to participate in the study. The use of a snowball sampling technique also helped to facilitate access to highly qualified women willing to participate in the research. In both Canada and Sweden, the distribution of participants includes 58% women and 42% men. At the OECD, the sample included 57% women and 43% men. The largest proportion of the sample is from the public sector; 52% of interview participants hold leadership positions in government or organizations that are primarily funded by government to support innovation within communities. Of the public sector sample, 53% of the sample is Canadian and 47% Swedish. The second largest subset of the sample is academic: 27% of the sample work in a university-based research setting, 55% in Canada and 45% in Sweden. Finally, 21% of the sample comes from the private sector, 30% from Canada and 70% from Sweden. The following table includes a breakdown of participants by country, sector and gender, for each of the two cases, Canada and Sweden. The following table presents the interview sample by country, sector, and gender. The figures for Canada and Sweden are calculated separately from the interviews conducted at the OECD.

Sector	Males	Females	Total	Percentage
Canada Public Sector	4	4	8	22%
Sweden Public Sector	3	4	7	19%
Canada Academic	2	4	6	17%
Sweden Academic	1	4	5	14%
Canada Private Sector	1	2	3	9%
Sweden Private Sector	2	5	7	19%
Total Canada Sweden	13	23	36	100%
OECD	3	4	7	100%

(a complete list of participants and their organizational affiliations, titles, countries, and cities can be found in Appendix A: List of Interview Participants).

In addition to striking a gender balance within the sample, the regional diversity in innovation networks in Canada and Sweden is significant to this cross-national case study. The research methodology reflects this diversity by selecting interview participants from a range of cities in each country. The variation in the interview sample facilitates a more nuanced comparison with government policy documents. Interview participants represent a spectrum of communities, from the most prosperous within each country, to those in periods of economic transition. Interviews conducted in Toronto, Vancouver, Ottawa, Calgary, Stockholm, Gothenburg, and Lund provide the perspective of leaders working in established innovation networks. Interviews in Hamilton, Windsor, Malmö,

and Linköping provide the perspective of leaders building innovation in communities going through periods of economic transition (Svensson et al., 2012). Interviews conducted with officials from the OECD in Paris, France speak to the similarities and differences between the two cases. Officials in the OECD, Directorate for Science Technology and Innovation, Gender Gap Project, and Country Studies Division, provide a global perspective on innovation policy and gender equality.

To interpret the interview data, a thematic approach is used, to draw out areas of interest from the interview sample. Using a spreadsheet longer responses were condensed into smaller units of data and categorized according themes based on interview questions set before the interviews took place and drawing on ideas that emerged from the data collection process (Kvale & Brinkmann, 2009). This approach facilitated the opportunity assess similarities and differences in responses to research questions by public sector, private sector, and academic leaders. The thematic approach is a critical aspect of the process in this study, given that the interview sample is selected based on a high level of technical knowledge and expertise (Kvale & Brinkmann, 2009). The sample participated in determining what issues and themes are relevant to the comparison of gender equality and innovation in Canada and Sweden. Three key themes emerged that form the basis of the data chapters on policy, performance measurement, and resource allocation. Within each of these overarching themes a number of specific categories emerged from the interview data that are explored within the dissertation. The following table provides a list of themes and categories used to group the interview data for analysis.

Themes	Categories
Policy	Historical development of innovation policy National innovation systems Politics of innovation policy Transnational innovation policy Gender mainstreaming
Performance Measurement	Historical development of women in innovation Gendered stereotypes and performance measurement Leadership, gender equality and board diversity
Resource Allocation	R&D spending on innovation Public sector innovation spending Private sector capital and innovation funding Social networks and mentorship

The final component of this case study is a document analysis, contrasting the knowledge of leaders within the sample frame to key government documents. The period from 2012 to 2014 is the focal point for the document analysis. A number of key policy documents and reports were produced during this period. The Review of Innovation Policy for Sweden 2012, and the Science Technology and Industry Outlook for Canada, 2012, offer the best comparative data on the state of innovation within both countries by the OECD within the timeframe of the study. The OECD also released the most comprehensive gender equality report to date, *Closing the Gender Gap: Act Now*, which provides a comparative perspective on gender equality cross-nationally. At the national level, the Swedish Ministry of Enterprise, Energy and Communications released the Swedish Innovation Strategy 2012, the most comprehensive innovation strategy in Swedish history. Similarly, Canada also released the Jenkins Report, formally titled *Innovation Canada: A Call to Action*, with advice from an expert panel to government on

the future direction of innovation policy within the country (Jenkins, 2011).

Comprehensively, the selected documents along with the knowledge of leaders within the sample frame construct a multidimensional dataset for this case study research.

### ***Interview Protocol***

The interview protocol for the study is designed to maximize the opportunity to learn from experts within the sample frame. The sample frame includes leaders from the public sector, private sector, and academia within Canada, Sweden, and the OECD. Semi-structured interviews were selected as the most appropriate format for this research study, to allow for both consistency and flexibility (Wildavsky, 2010). While maintaining a core set of research questions and themes, semi-structured interviews may be adapted to pursue lines of questioning in each interaction to fit with the industry, location, and expertise of the informant. Developing an understanding of the organization's mission in preparation for the interview facilitated rapport and time management (Wildavsky, 2010).

The interviews were conducted in the style of "interviewer as craftsman," to accommodate the diverse knowledge base of the interview sample (Kvale & Brinkman, 2009). In this approach, the interviewer is someone who embodies a set of core principles, which include being: "1) Knowledgeable 2) Structuring 3) Clear 4) Gentle and 5) Sensitive 6) Open 7) Steering 8) Critical 9) Remembering 10) Interpreting" (Kvale & Brinkman, 2009, p. 166). Using these core principles, the semi-structured interview format flows in the style of a conversation. Active listening allows the researcher to build on the information offered by the informant throughout the interview, and employ the "art

of the second question” (Kvale & Brinkman, 2009, p. 133). This interview style is particularly suited to the discussion of women and innovation policy. Many experts knowledgeable in the area of innovation may not initially be conscious of the connection between institutional norms, gender, and performance at the organizational level. The “art of the second question” provides an avenue for informants to reflect on these issues in the context of their daily business operations. This approach elicits insights, observations, and personal experiences that connect organizational norms and practices to broader themes explored throughout the research. In this context, the researcher is also able to probe into the specific dimensions and nuances of knowledge unique to each interview subject.

The practical aspects of the interview protocol were developed and implemented according to McMaster University standards for ethical research. The snowball sample technique was modified to ensure that the identity of each interview subject remained confidential, until the interview participant gave informed consent to share any identifying information. Each person was contacted individually using an introductory email that outlined the purpose of the study (Appendix B). Each interview began with a discussion of the proposed research questions, objective of the research, and the rights of the informant to control their participation in the study, including exiting the study. Interviews were conducted on the principle of informed consent, and written consent was obtained from each participant (Appendix C). Some interview subjects have elected to have their identity protected, and therefore only some names of interview subjects appear within the text. In the case that the identity of one interview subject could potentially

reveal the identity of a participant who has not consented to the use of their name and organization, both identities are protected to ensure privacy. With the written permission of the informant, where possible, interviews were recorded using an iPhone device, and then transcribed using Dragon Dictation software. When recording was prohibited, handwritten notes were taken during interviews and supplemented with additional notes immediately after the interview concluded. Of the 44 interviews conducted, 39 were conducted in person, and 5 by telephone. The following section discusses the research questions for the study and the supplementary interview guides used across each of the subset of interview informants.

### ***Interview Questions***

This section addresses the specific interview guides that were developed in preparation for meetings with representatives from government, the public sector, academics, business leaders, and representatives from the OECD (see Tables 1.1 to 1.5). In the previous section, the semi-structured interview format was discussed in detail. Keeping with the semi-structured interview format, each of the interviews began with a brief introduction of the first four research questions that form the basis of the study. The fifth question focuses on a comparison of Canada and Sweden explored in the analysis of the research data. The research questions are listed as follows:

- 1) How do Organization for Economic Cooperation and Development (OECD) innovation norms influence the inclusion of women in innovation policy at the national level in Canada and Sweden?
- 2) Do existing theories of innovation explain women's experiences as innovators and entrepreneurs within national innovation systems?

- 3) How can the obstacles to women's full participation in national innovation systems be overcome?
- 4) What is the unique contribution that women's engagement in innovation policy can make to economic prosperity in a global knowledge economy?
- 5) How do Sweden and Canada differ in incorporation of gendered approaches to innovation policy?

Following the introduction of the research questions, each interview began with a brief discussion of each organization's mandate, and the role of the leader being interviewed within the organization. The interview guides in tables 1.1 to 1.5 describe the questions consistently asked across each of the 44 interviews. Within each of the specific subsets of the sample, questions were asked that relate to four key themes: theory, policy, performance measurement, and resource allocation.

Raising issues from interviews in Canada while in Sweden, and vice versa at times, helped interview subjects to step out of their experiences, and discuss issues that may appear too ordinary to mention but are significant in comparative research (Berry, 2002). The "art of the second question" facilitated the opportunity to discuss local programs and initiatives to add context to the interview data, as well as answering the questions which remained consistent across the interview sample (Kvale & Brinkman, 2009, p. 133). The following section includes a description of the research questions used to develop a qualitative understanding of women and innovation in Canada, Sweden, and the OECD.

**Table 1.1 Government Policy Professionals: Example Interview Questions**

<b>Government Policy Professionals</b>	
<b>Theoretical Questions</b>	<ol style="list-style-type: none"> <li>1) How closely does the government work with academic institutions and/or partners from the private sector?</li> <li>2) What type of information and resources does the government share?</li> <li>3) Do you have prior work experience in academia and/or the private sector?</li> </ol>
<b>Policy Questions</b>	<ol style="list-style-type: none"> <li>1) How did the current innovation policy in Canada/Sweden develop?</li> <li>2) What best practices have informed the current policy?</li> <li>3) Does the government draw on best practices from other countries? If so, which countries?</li> <li>4) Does advice from the OECD shape government innovation policy decisions in Canada/Sweden? If so, how?</li> <li>5) How does gender equality factor into the government's current innovation strategy in Canada/Sweden?</li> </ol>
<b>Performance Measurement Questions</b>	<ol style="list-style-type: none"> <li>1) What performance measures does government have in place to assess the effectiveness of innovation policy in Canada/Sweden?</li> <li>2) How often are performance reviews conducted in Canada/Sweden?</li> <li>3) Is mandatory participation in government innovation reviews required for partners outside government? For example, groups that receive government grants in the private sector and academia?</li> <li>4) Does the government in Canada/Sweden maintain gendered statistics on indicators used to assess innovation system performance?</li> <li>5) What is the greatest challenge or opportunity to including gender-based analysis in innovation performance measurement in Canada/Sweden?</li> </ol>
<b>Resource Allocation Questions</b>	<ol style="list-style-type: none"> <li>1) What types of innovation projects is the national government responsible for funding in Canada/Sweden?</li> <li>2) Are regional disparities taken into account in funding decisions?</li> <li>3) What mechanisms does the government of Canada/Sweden have in place to ensure that women and men are treated equally in the funding process?</li> <li>4) Does the government in Canada/Sweden measure what percentage of public funds are allocated to businesses and projects led by women? If so how?</li> <li>5) Does the government in Canada/Sweden measure the percentage of women and men applying for government innovation funding? If so how?</li> </ol>

**Table 1.2 Public Sector Leaders: Example Interview Questions**

<b>Public Sector Facilitating Innovation in Communities</b>	
<b>Theoretical Questions</b>	<ol style="list-style-type: none"> <li>1) How closely does your organization work with academic institutions and/or partners from the private sector and/or different levels of government?</li> <li>2) What type of information and/or resources does your organization share with partners in the community?</li> <li>3) Do you have prior work experience in academia and/or the private sector and/or different levels of government?</li> </ol>
<b>Policy Questions</b>	<ol style="list-style-type: none"> <li>1) Which aspects of government policy are most closely related to the work of your organization?</li> <li>2) In your experience, do government policies have gendered consequences for the men and women you work with in your organization?</li> </ol>
<b>Performance Measurement Questions</b>	<ol style="list-style-type: none"> <li>1) How does your organization measure performance and contribution to innovation in Canada/Sweden?</li> <li>2) Does your organization participate in performance measurement review led by government? If so, which level of government?</li> <li>3) Does your organization keep gender-based statistics? If so, on what types of indicators?</li> <li>4) Are you required to report gender-based statistics to the national government in Canada/Sweden?</li> </ol>
<b>Resource Allocation Questions</b>	<ol style="list-style-type: none"> <li>1) What is the funding model for your organization? Which levels of government does your organization receive funding from?</li> <li>2) Does your organization receive funding from the private sector?</li> <li>3) Does your organization provide funds to business startups? If so are funds allocated by your organization equally available to men and women?</li> <li>4) In your organization, do you have evidence of gendered differences in resource allocation?</li> <li>5) Other than direct grants, what type of resources does your organization provide to innovators? Advisory services, and/or networking opportunities, and/or office space, and/or any other assistance?</li> </ol>

**Table 1.3 Academic Innovation Experts: Example Interview Questions**

<b>Academic Innovation Experts</b>	
<b>Theoretical Questions</b>	<ol style="list-style-type: none"> <li>1) How closely do you work with government and/or partners from the private sector?</li> <li>2) What type of information and resources do you share?</li> <li>3) Do you have prior work experience in government and/or the private sector?</li> <li>4) What is your role in the innovation process? Advisory? and/or Research? and/or Commercialization?</li> </ol>
<b>Policy Questions</b>	<ol style="list-style-type: none"> <li>1) How does your research address innovation policy?</li> <li>2) Do you consider the gendered implications of innovation policy in your research?</li> <li>3) What aspect of your innovation research is unique to Canada/Sweden?</li> <li>4) Do you provide innovation policy advice to government in Canada/Sweden? If so, which level of government?</li> </ol>
<b>Performance Measurement Questions</b>	<ol style="list-style-type: none"> <li>1) Over the course of your career, have you observed changes in innovation policy priorities in Canada/Sweden? If so, how?</li> <li>2) In your experience, what is the relationship between academic scholarship and performance measurements of national innovation systems in Canada/Sweden?</li> <li>3) Have you ever included gendered performance measures in your research? Are you required to do this by government and/or academic publishers?</li> </ol>
<b>Resource Allocation Questions</b>	<ol style="list-style-type: none"> <li>1) Do you receive research funding or grants from government and/or the private sector? If so, how do these grants contribute to innovation?</li> <li>2) In your experience, do men and women in your institution have equal opportunity to access government and/or private sector innovation funding?</li> <li>3) Are you required to provide any information to your institution and/or government on the number of men and women working on a particular innovation project? If so, does this influence the composition or research teams within your organization?</li> <li>4) Does the gender composition of research teams influence access to government and/or private sector research funding?</li> </ol>

**Table 1.4 Private Sector Business Leaders: Example Interview Questions**

<b>Private Sector Entrepreneurs/Business Leaders</b>	
<b>Theoretical Questions</b>	<ol style="list-style-type: none"> <li>1) In your leadership position, do you work with academic institutions and/or partners from government?</li> <li>2) What type of information and resources do you share? Is the process of information sharing formal or informal in nature?</li> <li>3) Is the business innovation used in your company founded through academic and industry collaboration?</li> <li>4) Do you have prior work experience in academia and/or government?</li> </ol>
<b>Policy Questions</b>	<ol style="list-style-type: none"> <li>1) Are you familiar with the government's national innovation strategy in Canada/Sweden?</li> <li>2) How does the government's current innovation policy influence your business decisions?</li> <li>3) In your time with this organization, have changes in government innovation strategy had an effect on the competitiveness of your business domestically and/or internationally?</li> </ol>
<b>Performance Measurement Questions</b>	<ol style="list-style-type: none"> <li>1) How does your organization measure innovation performance?</li> <li>2) Does your organization measure gender equality at the firm level?</li> <li>3) Does the government require your organization to report on gender equality as a performance measure?</li> <li>4) Is gender equality reporting required in exchange for government funding?</li> </ol>
<b>Resource Allocation Questions</b>	<ol style="list-style-type: none"> <li>1) Does your business have the resources you need to develop and grow your business nationally, and/or internationally?</li> <li>2) Have you ever sought government-sponsored venture capital? If so, how did the government funding process compare to seeking funds from venture capitalists or private financial institutions?</li> <li>3) What resources would you like to have greater access to?</li> <li>4) Does your organization rely on support from the public sector for advisory services, and/or office space, and-or networking opportunities?</li> </ol>

**Table 1.5 OECD International Expert: Example Interview Questions**

<b>OECD International Experts</b>	
<b>Theoretical Questions</b>	<ol style="list-style-type: none"> <li>1) What is the role of the OECD in the innovation process?</li> <li>2) How does the OECD work with national governments to conduct country reviews?</li> <li>3) What type of information and resources does the OECD share with Canada/Sweden?</li> <li>4) What mechanisms are in place to share best practices between countries bilaterally and among all member nations? Does this include best practices on gender equality?</li> <li>5) In the structure of the OECD, what is the relationship between gender equality research and other directorates?</li> </ol>
<b>Policy Questions</b>	<ol style="list-style-type: none"> <li>1) What processes does the OECD use to engage member states in innovation policy development? Do the Canadian and Swedish governments engage differently in these processes?</li> <li>2) Does the OECD consider the gendered implications of innovation policy within the organization's research agenda?</li> <li>3) Is there a connection between the policy research carried out in the OECD Gender Gap Project and the Directorate for Science Technology and Innovation?</li> <li>4) How has innovation policy developed and changed in Canada and Sweden? Is this consistent with the direction and trends in other OECD member countries?</li> </ol>
<b>Performance Measurement Questions</b>	<ol style="list-style-type: none"> <li>1) How do the Frascati and Oslo Manuals facilitate debate on OECD innovation performance measurement priorities in member countries? Is this debate different in Canada and Sweden?</li> <li>2) What is the process for updating the performance measures in OECD innovation manuals?</li> <li>3) Does the OECD consider the gendered implications of statistics on innovation research and performance measurement?</li> <li>4) What are the greatest challenges to expanding the gender-conscious performance measurement in OECD innovation research cross-nationally?</li> </ol>
<b>Resource Allocation Questions</b>	<ol style="list-style-type: none"> <li>1) What role does the OECD play in advising member states on funding innovation? Is this advice different in Canada and Sweden?</li> <li>2) Do OECD innovation norms influence government spending patterns at the national level? Have these patterns changed in Canada and Sweden due to best practices shared within the OECD?</li> <li>3) Does the OECD request or have access to information on the proportion of resources allocated to men and women in innovation-related work within member countries?</li> </ol>

## **Conclusion**

The use of a comparative case study methodology has many benefits. In this study, the combination of elite interviews and document analysis provide a holistic understanding of the role of women in national innovation systems in Canada and Sweden. Elite interviews provide valuable insight into the relationship between gender and innovation, which is often undocumented in government innovation policies and reports (Tansey, 2007). The subject of women and innovation policy is gaining momentum in academic research as well as among practitioners, yet the research available on the topic is still quite limited. There is a genuine opportunity to make an original contribution, both theoretically and empirically, to the field of innovation research, as well as to contribute to the understanding of gender and public policy in Canada and Sweden. The theoretical construct of feminist institutionalism has not yet been applied to the domain of innovation policy. The study may therefore offer new insight into the potential utility of feminist institutionalism as a framework for policy analysis outside of the domain of what are traditionally considered women's issues. This research methodology provides the basis for the following data chapters explore the themes of policy, performance measurement, and resource allocation that emerged in the interview data.

## **CHAPTER 3**

### **CHAPTER 3: Feminist Institutionalism and the Triple Helix Model**

#### **Introduction**

The theoretical approach to this case study of women and innovation in Canada and Sweden is an interdisciplinary one that draws on the work of feminist institutionalism and the triple helix model. Together these theoretical approaches map the historical development of institutions that form the foundation of innovation policy, performance measurement, and resource allocation across cases. Feminist institutionalism is a diverse theoretical construct with scholars building on different schools of institutionalist thought, and incorporating gender perspectives to push the theoretical understanding of gender, politics, and public policy forward (Krook & Mackay, 2011). Feminist institutionalism assumes that if institutions are gendered, it is possible to “regender” them in ways that promote equality (Beckwith, 2005, p. 133; Krook & Mackay, 2011).

The triple helix model has contributed significantly to understanding how governments, universities, and industry can best work together to create an environment that is conducive to innovation (Etzkowitz & Leydesdorff, 1996). Historically, this model was developed by researchers observing the economic growth and development taking place in the 1920s and 1930s in Boston, Massachusetts. Partnerships between Massachusetts Institute of Technology (MIT), industry, and the city of Boston became the foundation underpinning the emergence of the biotechnology and computing industries in

the United States. The triple helix has come to form the backbone of much of the innovation literature and is implicit in government-sponsored innovation programs. In practice, the triple helix has informed government decision-making, and policy initiatives that encourage the growth and development of government, industry, and academic partnerships in Canada, Sweden, and many OECD countries. The theory has taken on a number of varieties and forms over time and in different national contexts. The triple helix describes the interaction of separate institutions—government, industry, and academia—as well as the new spaces that are created due to organizational cooperation and synergy.

The gendered implications of the triple helix have not been fully explored from a theoretical perspective within the existing innovation literature. In addition, the gender and public policy literature in Canada has not addressed innovation policy as a feminist issue in the same depth as in the Swedish case. Feminist institutionalism provides a theoretical framework to challenge the gender-neutral assumptions in the triple helix, and create the equality of opportunity to innovate within existing institutional structures. The triple helix model addresses physical spaces, virtual networks that facilitate shared understandings, and established sites of innovation. Feminist institutionalism is premised on two levels: first, “the understanding that institutions consist of formal rules and informal norms, and second, that institutions are complex systems that may work in permissive or obstructive ways [that] are particularly pertinent when examining processes of institutional reform and innovation” (Krook & Mackay, 2011, p. 184). Increasingly,

public policies are deliberately or implicitly designed to stimulate triple helix networks, which is problematic without considering the gendered implications of these arrangements. Women in both Canada and Sweden, countries where gender equality is relatively high by global standards, are significantly less likely to participate in innovation-related work (Andersson et al., 2012; Pouragheli & Beckton, 2013). The hypothesis explored within this chapter is that structural inequality inhibits the intended function of the triple helix model. The concept of innovative is subjective, and historically dominated by masculine norms such as risk-taking, high-technology-driven enterprises, and scalable business expansion (Andersson et al., 2012). When women and men fail to adhere to masculine norms that dominate the institutions within the triple helix, they are marginalized from accessing valuable resources that facilitate innovation.

This chapter is structured in two parts, the first section explains the triple helix model from a feminist institutional perspective. The second section of the chapter includes a discussion of the theoretical implications of gender inequality within each of the three strands of the triple helix: government, industry, and academia. The chapter concludes with the implications of gender inequality in the new spaces created by government, industry, and academic cooperation, considering the cumulative nature of structural inequality. The original contribution to knowledge made in this theoretical chapter challenges the explanatory power of the triple helix model from the perspective of gender inequality in Canada and Sweden. This chapter also contributes to the theoretical understanding of the triple helix model from the perspective of feminist institutionalism,

and makes a new contribution to the comparative literature on gender and public policy in Canada and Sweden. The practical implications of this chapter are focused on explaining how obstacles to women's full participation in national innovation systems might be overcome by "regendering" institutions to facilitate equality of opportunity in triple helix projects (Ackerly & True, 2010).

### **The Triple Helix Model: A Feminist Institutional Perspective**

The theoretical framework for this case study extends theories of gender and institutionalism to the field of innovation policy through a critical analysis of the triple helix model. Feminist institutionalism is a diverse field of scholarship that draws on institutional and new institutional schools of thought (Krook & Mackay, 2011). The inclusion of gender in the study of institutionalism provides an interesting point of entry into the field of innovation policy. The feminist institutionalist perspective challenges the conventional understanding of the triple helix model, and the spaces created by university, government, and industry partnerships in Canada and Sweden. The spaces that are formed within the complex institutional power structures of the helix have gendered implications. The underlying assumption of bureaucratic neutrality within the administration of innovation policy and programs creates a barrier to understanding innovation within the context of equality and gender bias (Chappell, 2002; Krook & Mackay, 2011; Stivers, 2002). Institutions are not monolithic in structure and therefore must be understood through the components of their parts, taking into account different institutional arenas and spaces (Krook & Mackay, 2011). In Canada and Sweden the difference in political

systems and institutional traditions has shaped the historical development of the institutions responsible for innovation. In Canada, federalism, and the division of powers between the federal, provincial, and municipal governments has, contributed to the decentralized innovation system. Research on social policy in Canada highlights the challenges that women's groups face in articulating interests to multiple levels of government. The absence of gender mainstreaming in Canadian intergovernmental relations also inhibits the transfer of women's interests across levels of government (Grace, 2011). In Sweden, the unitary state has contributed to the centralized approach to innovation policy and the commitment to innovation systems thinking. From the perspective of gender equality, the Swedish system provides a singular focal point at the national level for women's organizations and feminist bureaucrats to articulate gender-conscious interests within mainstream innovation institutions, even if these institutions are at times gender-blind (Pettersson & Lindberg, 2013).

The relationship between institutions and gender is not fixed but rather fluid, related to the wider culture and the social context that institutions are embedded within: "To say that an institution is gendered means that constructions of masculinity and femininity are intertwined in the daily culture or 'logic' of political institutions, rather than 'existing out in society or fixed within individuals which they then bring whole to the institution'" (Kenney, 1996, p. 456; Krook & Mackay, 2011, p. 6). In the innovation literature, much of the research on the logic of institutions and the culture of masculinity in innovation work has focused on micro-level interactions that take place at the

departmental level within universities, government, and industry (Etzkowitz & Gupta, 2006; Etzkowitz & Ranga, 2011). Tracing the origins of this literature through the development of the triple helix model draws attention to the functions of innovation architecture as well as the path dependency inherent within institutions that constrain innovation at the societal level (Kenny, 1996).

A significant body of research has been developed on the implicit and explicit discrimination that women face in STEM (Science, Technology, Engineering and Mathematics) those fields, which are most commonly associated with innovation work (Etzkowitz & Gupta, 2006; Etzkowitz, Kemelgor, & Uzzi, 2000; Etzkowitz & Ranga, 2011; Ranga & Etzkowitz, 2010). This body of literature has helped to advance both the theoretical and empirical understanding of gendered norms that are often implicit in scientific work environment and institutions of higher education. In 1994, *Science* published a study done in several university departments in the United States which highlighted several important findings for theory building. The first was the paradox of critical mass, which demonstrated that even when women reached over 15% of tenured faculty in a given department, women became splintered into subgroups. At the departmental level, the presence of subgroups left many female researchers and graduate students without adequate support networks. The lack of mentorship and role models hindered women from advancing to the highest levels within academia, and university administration more broadly (Etzkowitz et al., 1994). This early research also categorized three models of working in scientific research, the “unitary male model,” the “traditional

male model” and the “traditional female model” of doing science. Each of these typologies reinforce particular gender stereotypes; however, these models also illuminate practical consequences that emerge for both men and women who attempt to challenge traditional gender roles in scientific work environments. While the significant entry of women into scientific careers around the world has all but eliminated the “unitary male model,” which is an all-male lab environment, the “traditional male model” is still pervasive in many university settings. The “traditional male model” is characterized by a scientific career at the centre of the researcher’s life, along with a supportive spouse who takes care of household responsibilities including care for children and elderly parents, household chores, and daily errands. Theoretically the “traditional male model” allows the scientist to work longer hours, and dedicate more time to professional development. The third model, the “traditional female model,” suggests that a researcher is seeking to combine a scientific career with marriage, pregnancy, and childcare responsibilities, thereby putting constraints on the time available to pursue a scientific career (Etzkowitz et al., 1994, p. 53). A scientist who adheres to the “traditional male model” significantly increases his or her chances of succeeding in the highly competitive university environment, whether the scientist is male or female. In particular, many women feel pressured by their advisors to adhere to departmental norms that are congruent with the “traditional male model” such as long working hours, uninterrupted by pregnancy or childcare-related leave (Browne, 2013; Etzkowitz et al., 1994, p.53). This model also reflects the fact that many academic institutions allocate few resources to help young

scholars balance a scientific career with family life (Etzkowitz et al., 1994). Research beyond the university departmental level addresses issues around women's scientific advancement throughout the life course (Etzkowitz et al., 2000).

The leaky pipeline is a theoretical concept developed by the authors to describe the large-scale entry of women into higher education, and their subsequent exit from science. The leaky pipeline asserts that many women voluntarily leave scientific careers or alternatively are forced out, causing a drip from the pipeline of innovation-related career paths (Etzkowitz et al., 2000; Hunt, 2016). Much of the practical policy focus on women in STEM fields has centred on repairing the leaks in the pipeline, rather than addressing macro-institutional forces that foster inequality in science. Encouraging more women to enter STEM fields in the transition from high school to university, and focusing on retention efforts at the university level, are important measures to encourage gender equality. However, the micro-institutional level of analysis does not adequately address the larger social and cultural issues that ascribe value to certain kinds of scientific work, and the relationship between government policy objectives at the national level and gender inequality in higher education.

The most recent theoretical work in the field by Etzkowitz and Ranga (2011) offers an alternative narrative to the leaky pipeline by portraying the different career trajectories of male and female scientists through a vanish-box analogy. In the leaky pipeline women are perceived to “drip” out of the pipeline permanently. In this model, investment in a women's scientific education is perceived as lost if she leaves a traditional

academic research setting. However, Etzkowitz and Ranga have found that women who train as academic research scientists often disappear from traditional university settings only to reappear in science-related careers outside of traditional research institutions (2011). From a theoretical perspective the vanish-box analogy provides a more rounded insight into the career paths of women who have advanced training in highly technical fields of study. When university environments present barriers for women in STEM, other allied work environments offer women alternative venues to pursue scientific work. The dispersion of women away from the university setting is an important theoretical consideration in a gendered understanding of the academic strand of the triple helix model. In the vanish box model, women find scientific careers; however, they are being driven away from traditional institutions of power and influence in science. The theoretical implications of the vanish box model may be extended by further exploring the relationship between power and change. In the feminist institutionalist literature inspired by new institutionalist theory, the questions of where power is derived from and how change is created point to functionalist and path-dependent perspectives (Kenny, 1996). A gendered understanding of scientific research institutions highlights the tension between institutional path-dependence on the labour force provided by those who conform to the “traditional male model” of doing science, and the function of creating innovation and scientific discovery. Those most likely to conform to institutional norms are not necessarily the most likely to imagine scientific problems in innovative ways, especially ways that challenge existing power structures.

Along with the body of literature dedicated to understanding the career trajectories of women in STEM fields, there is a growing body of literature on the theoretical participation of women in innovation more broadly (Andersson et al., 2012; Danilda & Thorslund, 2011; Lorentzi, 2011). This body of work addresses the gendered dimensions of innovation work that differ from the concerns of women in science and technology exclusively. The literature speaks to a shift in many advanced industrialized countries from manufacturing-based to knowledge-based economies (Hafkin & Huyer, 2006; Walby, 2011). The rise of knowledge-based economies has changed the substantive nature of the types of innovations that countries seek to produce. The traditional emphasis on product innovation has been expanded to include service-based, marketing, public sector, and social innovations (Andersson et al., 2012). While women have traditionally had fewer positions in manufacturing, the advanced levels of education that women now obtain in OECD countries should in theory position women to make significant contributions to the knowledge-driven economy (Ranga & Etzkowitz, 2010). However, research suggests that the knowledge-based economy is gendered in different ways, and that the women's skills are often devalued (Walby, 2011). Innovation in feminized sectors of the economy such as healthcare, education, and childcare are not yet part of the mainstream innovation discourse. As such, these sectors fall outside of the scope of existing institutional frameworks (Bedell, 2014; Nahlinder, 2010; Sundin, 2012;).

Along with sectoral differences, geographic differences also influence the nature of institutional norms, and gender dynamics within innovation networks. At the regional

level, economic development is often characterized as men's work, and therefore women are more likely to be excluded from networks and spaces where innovation takes place (Danilda & Thorslund, 2011; Hedfeldt & Hedlund, 2012). Geographic location is also an important factor in determining how gender relations factor into innovation: "The social identities of innovators figure into the way that institutions in particular contexts promote, value, and define innovations" (Blake & Hanson, 2005, p. 686). The authors go on to argue that "the gender identity of the innovator may be received differently across different times and places, impacting the degree to which the innovator is encouraged or discouraged from pursuing their work" (Blake & Hanson, 2005, p. 686). This is also strongly correlated with the idea male-dominated industries are naturally more competitive and economically sound (Lorentzi, 2011). This is supported by research in Sweden which indicates that in practice, triple helix innovation systems both emphasize and sustain traditional masculine norms in entrepreneurship by consistently supporting projects in male-dominated industries (Lindberg et al., 2014). The following section explores each of the three strands of the triple helix model separately and addresses the specific ways that government, industry, and academic institutions in Canada and Sweden approach gender equality in the innovation process.

### ***Triple Helix Government: States Systems and the Logic of Inclusion***

This comparative study of Canada and Sweden brings forth different theoretical approaches to state responsibility and the logic of inclusion of women in innovation policy. The unitary system of government, as well as women's substantive representation

within government, explain why the Swedish government has taken a more proactive approach than Canada to gender equality in the national innovation policy portfolio.

Women in Sweden are more likely to hold senior roles within the bureaucratic institutions responsible for innovation than in the Canadian context. In addition, federalism in Canada has contributed to a diffuse network of regional innovation networks that have not been developed to complement a national policy objective (Salazar & Holbrook, 2007).

There is a significant body of literature on the relationship between multilevel governance and the challenges and opportunities to advance women's rights through different levels of institutional engagement (Haussman, Sawyer, & Vickers, 2010). This body of literature is increasingly focused on economic, environmental, and transnational public policy issues, and the implications of multilevel governance for gender equality (Sawyer & Vickers, 2010). However, this field of research has not yet addressed innovation policy, and the role that multilevel governance plays in shaping women's role in innovation as consumers and producers of new ideas and technologies.

Innovation policy is not traditionally conceptualized as a women's issue, and this explains in part why the Canadian government has failed to focus attention on gender equality in this area. Without sustained pressure from women's organizations to address gender equality in innovation spaces, this issue is not on the political agenda. In Canada, there are many organizations that advocate for women in science, technology, mathematics, engineering, medicine, and entrepreneurship, yet these organizations do not articulate a shared vision of women's inclusion in innovation policy nationally. In the

liberal democratic welfare state, the role of interest groups as agents of change is important to the development of gender-conscious policy in Canada (Mazur, 2002). Federalism in theory provides multiple venues and opportunities for women's groups to articulate interests where they see opportunities to effect change (Gray, 2010). However, this requires a cohesive policy vision, and the resources necessary to effect change on multiple fronts. Vickers draws attention to the excessive burden that federalism places on women's organizations to operate effectively at the municipal, provincial, and federal levels in Canada (1994). In innovation policy, federalism has a significant effect on the lack of discourse on gender equality in innovation spaces. Without a single ministry at the federal level responsible for a comprehensive innovation strategy, and the vast majority of provincial innovation plans falling under multiple program areas, there is not a clear focal point to begin the process of gender mainstreaming in the innovation policy discourse in Canada.

The theoretical explanation for the difference in approaches to the inclusion of women in innovation policy in Sweden begins with the strength of the unitary state. In Sweden, the national government has considerable influence over the inclusion and role of women in the innovation policy discourse. Lindvert (2007) argues that the strength of gender equality policies can be traced back to the 1960s in Sweden. Corporatist arrangements were struck between key actors in Sweden to ensure equal rights for women to work, and shared childcare responsibilities was a state priority. The Swedish model relies less on the strength of a cohesive women's movement in particular policy domains

and more on the role of experts advising the state on gender equality issues (Lindvert, 2007). Over the last 20 years the Swedish government has funded a number of research projects on women and innovation, which have led to government reports and academic publications (Andersson et al., 2012; Danilda & Thorslund, 2011). The growth and development of research has contributed to a mutual learning among state officials and practitioners around the specific challenges of addressing gendered barriers to women's inclusion in innovation within Sweden. The challenge that exists in Sweden is vertical integration between national policy objectives and implementation in the regions. Local governments in Sweden have a high degree of autonomy from the national government (Hudson, 2012; O'Connor, Orloff, & Shaver, 1999). Although the national policy objective states a clear commitment to gender equality in innovation, there are challenges in implementation. The autonomy at the regional level is one explanatory variable for the unexpected similarity in the challenges of achieving gender equality in innovation in both cases.

***Industry: Labour Force Participation and the Evolution of Innovative Industries***

The relationship among government, industry, and academia within the triple helix is largely dependent on the structure of the state, and the historical relationship between government and business. In Canada, the liberal market approach minimizes state intervention and emphasizes a strong role for private institutions in the economy, which has produced sharper boundaries between government and industry than exist in the

social democratic system in Sweden (O'Connor, Orloff, & Shaver, 1999). The implications of the relationship between government and industry are significant for women's employment, labour market participation broadly, and gender equality in innovation work specifically. Social welfare and employment policies in Sweden have historically focused on reducing barriers to employment for women by redistributing domestic labour more evenly between men and women, as well as sharing the burden with the state (Lindvert, 2007; O'Connor, Orloff, & Shaver, 1999). By contrast, the labour market structure in Canada is more closely aligned with the male breadwinner model, which reinforces women's roles as unpaid caregivers (O'Connor, Orloff, & Shaver, 1999). Women in Canada have high rates of labour force participation even though the state provides limited support for childcare and this support varies depending on provincial jurisdiction (Briskin & Eliasson, 1999). The Swedish model has produced high levels of employment among women; however, it has also produced higher levels of labour market segregation than in the Canadian case. The prevalence of labour market segregation and stratification in both countries is imperative to explaining why women are often excluded from innovation-related work.

In the Swedish economy women are more likely to be segregated in part-time employment, service sector, and public sector employment than in the Canadian case (O'Connor, Orloff, & Shaver, 1999). However, in both countries women have not historically held leadership positions in industries where there is distinct linkage between government investment in innovation research and industrial growth. The historical

trajectory of the national innovation system in Sweden has evolved in concert with the growth and development of the forestry, mining, and engineering industries (Edquist & Lundvall, 1993). These industries have historically been dominated by a few key firms, and the legacy of concentrated industrial growth is a defining feature of the innovation landscape in Sweden (Edquist & Lundvall, 1993). In Canada, national and provincial governments have historically prioritized R&D investment in the natural resource sectors, in areas such as agriculture, energy, and mining (McFetridge, 1993). The innovation landscape is more diffuse in Canada, with a lower level of concentration than in the Swedish case, which provides more opportunity for small and medium sized enterprises to innovate. However, the historical development of innovative industries in both cases has not been not congruent with women's employment patterns.

Inequalities in the labour market are the product of inequalities external to the labour market, and for this reason it is important to address both direct and indirect forms of discrimination against women in the workforce (Mazur, 2002). Canada and Sweden have enacted formal legislation on the equal treatment of women in the workforce since the late 1970s. The Swedish legislation has focused on creating "equal opportunities" and facilitating "positive action." In contrast, the Canadian legislation has focused on "anti-discrimination" and "positive action" (Mazur, 2002, p. 84). In the Swedish case, equal pay has evolved through collective bargaining by unions aimed at increasing the salary of low-wage workers, who are disproportionally female, rather than achieving women's equality through equal pay initiatives (Bacchi, 1999). It is only in recent times that

corporatist relations in Sweden have declined, and unions have become vocal supporters of equal pay for women to facilitate legitimacy in neoliberal times (Mazur, 2002).

However, this may not be a positive development: O'Connor, Orloff, and Shaver (1999) concur that collective wage negotiations are a more effective way of increasing women's pay than enacting equal pay legislation. In Canada, equal pay legislation has been most effective for women employed in the public sector, where collective agreements contribute to consistent pay across job classifications, than for women in the private sector (O'Connor, Orloff, & Shaver, 1999). In both countries, the legislative and institutional frameworks developed to facilitate women's access to the labour market have not eliminated pay gaps, and women remain underrepresented in many of the areas of the workforce instrumental in the foundation and growth of innovation within the economy.

In Sweden, in the 1990s a shift from a social democratic to a neoliberal innovation agenda similar to Canada has adjusted government priorities toward the development of small and medium sized enterprises as a vehicle for regional economic growth (Hudson, 2012). This shift has opened new avenues for women to participate in agenda-setting and goal formation in innovation work. In this discourse women are seen as both an asset and liability. When women possess the educational background and communication skills necessary to succeed in entrepreneurship they are viewed as a commodity essential to the growth of innovative regions. Alternatively, when women are engaged in caring activities, or when ethnicity, class, age, disability or education intersect and remove women from the workforce, they may be reduced to essentialist notions of

dependency on the state, reinforcing stereotypes around women as an obstacle to innovation (Hudson, 2012). This neoliberal shift is an important aspect of the theoretical puzzle that explains why the interest in gender equality in innovation is growing globally.

***Academia: Science, Technology, Innovation, and Inclusion***

Academic institutions are an important part of the triple helix model. Universities and researchers are integral to the development and dissemination of knowledge in the innovation process. Patents provide a gauge for innovation output in the university setting, however patent systems are laden with gendered norms and practices that impact how innovation is defined in practice (Burk, 2011). Women are also historically and presently less likely to hold patents both in science, technology, and engineering as well as in other domains of innovation (Hunt et al., 2011). Academic institutions have the resources and talent pool to engage in primary research in the early stages of discovery, however women are less likely than their male colleagues to patent inventions within the university setting (Hunt et al., 2011). Universities also provide a focal point for academic, industry, and government partnerships; through scholarships and grants, governments are able to stimulate innovation networks and research clusters. The strength of the public education systems in Canada and Sweden, as well as the knowledge outputs including publications in international journals and patents by researchers in tertiary institutions, are competitive advantages in the innovation process. Increasingly, government policies are aimed at encouraging academics to work with industry and bring innovations to market through collaborative processes. Often the skill sets and career aspirations of academic

researchers are at odds with an entrepreneurial career path. The path to tenure in the Canadian and Swedish university systems is reliant on publication records rather than entrepreneurial output. In Sweden, professors have exclusive rights to patents created at the university. Although this professor's privilege provides some incentive to produce commercial outputs, it does not replace publication as the chief sign of academic success and criteria for promotion (Ejerme & Jung, 2012). The new emphasis on universities as sites of production beyond academic knowledge is something that has not yet been reconciled with the regular demands of academic life. A gender-conscious perspective on the role of academic institutions in the triple helix structure explains why education is critical to women's inclusion in the innovation process.

Feminist institutionalist literature on women and education comes from two distinct and competing perspectives. The first perspective is that education serves as a path to emancipation and empowerment for women by providing them with the necessary knowledge and skills to engage in the labour market (Julien, 1987; O'Connor, Orloff, & Shaver, 1999). The alternative perspective rooted in critical pedagogy studies is that education reinforces existing forms of patriarchy and class-driven conformity that are detrimental to women's emancipation (Luke & Gore, 1992; McLeod et al., 1993; Yates, 1994). In particular, the study of science and technology draws these competing perspectives into focus and raises questions about the challenges for women as innovators within existing educational institutions. Bacchi frames this discussion through the lens of "what is the problem meant to be?" (Bacchi, 1999, p. 116). This approach highlights key

presumptions that underpin the integration of women and girls into nontraditional areas of study. The “problem” of “women’s inequality” is framed as women having a lack of access to the labour market, and the limitations that arise from this (Bacchi, 1999, p. 116). The problem of women in science and technology is framed as a shortage of women entering prestigious fields, rather than a lack of men entering less prestigious fields, such as the humanities and arts, traditionally occupied by women (Bacchi, 1999). Lastly, encouraging women and girls to study in science and technology furthers an economic discourse which emphasizes technology and innovation as integral to international competitiveness (Bacchi, 1999). The problem with these beliefs is the underlying assumptions that women and girls who do not wish to partake in innovation are somehow deficient (Gaskell et al., 1999). Conversely, the inclusion of women and girls in the study of science and technology in the university setting is often a measure of women’s achievements in academia and sign of gender equality within society (O’Connor, Orloff, & Shaver, 1999).

Increasingly, feminists are reclaiming the contributions of women in science and technology and reframing the gendered notion of innovation through the lens of women’s historic but often unreported contributions through the decades (Jaffe, 2003; Layne, Vostral, & Boyer, 2010; Vare & Ptacek, 1988). Rather than being viewed as nontraditional actors, women have had their achievements go unrecognized or attributed to men erroneously. In fact, women have always been part of science, technology, and innovation, and thus are not nontraditional actors within the innovation space. Current

shortages of women in science, technology, and innovation are contingent on cultural norms and practices that inform institutional structures, rather than exemplifying a lack of interest or competence in scientific pursuits along gendered lines.

## **Conclusion**

The triple helix model of government, industry, and academic cooperation explains how national innovation systems are constructed. The institutions individually are the points of entry into the study of gender equality within the innovation policy domain. The historical relationship among the state, academia and industry highlight different challenges and opportunities to engaging in discussions on gender equality. Feminist institutionalism draws attention to the idea that “not only are gender relations seen to be ‘institutional’, these relations are ‘institutionalized’, embedded in particular political institutions and constraining and shaping social interaction” (Mackay et al., 2010, p. 580). These institutionalized constraints transcend physical spaces and shape the way that knowledge is produced and shared through innovation networks.

Feminist institutionalism suggests that the gendered nature of government, industry, and academic relations influence ideas about what is innovative and accepted within innovation systems in Canada and Sweden respectively. Gender equality in science, technology, and innovation is complex given the intersectional nature of women’s lived experiences and interactions with government, industry and academic networks (Bacchi, 1999). Gendered experiences are an important, but often overlooked, variable in scientific and creative processes. The implications of prioritizing gender in

innovation research are pathbreaking (Andersson et al., 2012). The value of gender-conscious innovation is most visible in the domain of medical research, where scientists now understand that men and women experience symptoms for life-threatening illnesses in different ways, and require different treatment options (Schiebinger, 2008). However, these pathbreaking insights are not limited to medical advancements. Environmental, social, economic, and technological innovations are evolving in new directions as a result of gender-conscious thought patterns.

The theoretical findings in this case study illuminate the need to further explore the technical and administrative features within the national innovation systems in Canada and Sweden, in order to explain how and why gender is under used as a variable for change. Feminist institutionalist scholars of employment policy have made distinctions between “equal opportunity” and “equal employment” to distinguish between types of policies enacted by governments to improve women’s labour market prospects. To draw on the field of employment policy, the term “equal opportunity” is holistic and implies labour market and non-labour market interventions to facilitate gender equality in the field of innovation (Mazur, 2002, p. 81). The following chapters explore the idea of equal opportunity through the development of innovation policy, performance measurement, and resource allocation in Canada and Sweden.

## **CHAPTER FOUR**

### **CHAPTER 4: National Governments and Gendered Innovation Policy**

#### **Introduction**

National innovation policy is of subject of immense interest among scholars and policy makers concerned with the question, what makes some countries more innovative than others? (Nelson, 1993). Much attention has been paid to understanding how countries develop and implement innovation policies across time and through different phases of industrialization (Lundvall, 2010; Nelson, 1993; Niosi et al., 2000). However, little scholastic attention has been dedicated to understanding how countries approach designing equality of opportunity in national innovation systems. In particular, the role of women and gender equality more broadly is an under-researched subject area. This chapter aims to contribute a deeper understanding of how two countries, Canada and Sweden, approach gender equality in the design and implementation of national innovation policy.

In Canada, Pouragheli and Beckton (2013) have conducted research on the narrow definition of innovation policy in Canada and the absence of women in the innovation discourse as a result of an overemphasis on STEM. Research has also focused on the gendered implications of OECD innovation surveys at the level of the firm in British Columbia (Crowden, 2003; Salazar & Holbrook, 2003). However, there is no body of

research that looks at how Canada's approach to gender and innovation policy differs from those of other national governments. Gender and innovation research in Sweden in many cases focuses on local and regional policy development (Hudson, 2012; Lindberg, Lindgren, & Packendorff, 2014). Comparative case studies have focused on other Nordic countries such as Norway and Sweden within the context of the European Union (Andersson et al., 2012; Danilda & Granat Thorslund, 2011). The local and regional focus is a logical reflection of the proximity to individual innovators (Forsberg, Pettersson, & Lindgren, 2012). Gender imbalance in innovation work is more visible in the local and regional context than in the national context (Lundkvist & Westberg, 2012). However, innovation policy is an area of national importance, and decisions made by national governments shape the regional and local context. It is for this reason that national policy objectives are the focus of this study. In Canada and Sweden, differences in political systems, economic objectives and the welfare state contribute to the gendered implications of national innovation policy frameworks (Esping-Andersen, 2002).

The political systems in Canada and Sweden contribute to different approaches to innovation policy-making within both countries. Sweden has taken a more holistic approach to innovation policy-making and implementation than Canada (Edquist, 2014). The unitary state structure in Sweden is more conducive to a national innovation policy agenda; however, strong regions create complexity in policy implementation (Hörnström, 2013; Hudson, 2012). The relationship between the federal and provincial governments in Canada has a significant impact on the structure of innovation policy and the layering of

responsibility through federal and provincial funding arrangements (Garrett-Jones, 2007). The economic objectives of innovation policy in Canada and Sweden are dissimilar to the extent that the Swedish economy is more reliant on innovation than in the Canadian case due to a relative absence of natural resources (Nelson, 1993). In addition to the economic factors that drive innovation, such as job creation and technological advancement, the cost and political importance of the welfare state is also a driver in the coordinated approach to innovation policy across sectors in Sweden (Swedish Innovation Strategy, 2012). The systematic integration of innovation policy across social and economic sectors of society sets the Swedish approach to innovation policy apart from the Canadian case. In Canada, innovation policy is focused primarily on technological innovation and policy measures designed to stimulate growth in high-tech industries (Pouragheli & Beckton, 2013). A holistic national approach is absent from the policy landscape, and provincial governments each have different approaches to innovation policy that complement or supplement a national agenda (Garrett-Jones, 2007).

This chapter is divided into five sections; the first section focuses on framing innovation policy through a gender lens within the context of social democratic and liberal welfare states in Canada and Sweden (Esping-Andersen, 1990; Orloff, 1993). The second section approaches the historical development of national innovation systems more broadly, drawing on the work of scholars who explain the development of national innovation systems through processes of industrialization and learning (Edquist & Lundvall, 1993; Freeman, 1995; Lundvall, 2010). This section also maps the institutions

critical to the development of innovation policy in both cases (McFetridge, 1993; Nelson, 1993; Niosi et al., 2000). The historical development of national innovation systems is also contrasted with the theoretical construct of path dependence and the exclusion of women from innovation policy (Pierson, 2000; Thelen, 2003, 2004; Waylen, 2011). The third section shifts to the politics of innovation policy in Canada and Sweden from the early 2000s to the time of the case study, contrasting approaches to innovation policy developed by Liberal and Conservative governments in Canada (Doern & Stoney, 2009) and by the Social Democratic and Moderate parties in Sweden (Liljemark, 2004; Marttilla, 2013). The fourth section looks at the relationship between gender equality and innovation policy in both countries, tracing important developments in innovation policy development and establishing the formal “rules of the game” (Krook & McKay, 2011). The period from 2012 to 2014 is the focal point for this analysis, as a number of key reports were produced by the OECD on both Canada and Sweden’s approaches to innovation policy in the last three years. These include *OECD Reviews of Innovation Policy: Sweden 2012*, *OECD Science, Technology and Industry Outlook: Canada, 2012* and *OECD Closing the Gender Gap: Act Now*. In addition, The Swedish Ministry of Enterprise, Energy and Communications released the *Swedish Innovation Strategy 2012* and Canada released the Jenkins Report, formally titled *Innovation Canada: A Call to Action*, containing the advice of an expert panel on the future direction of innovation policy within the country (Jenkins, 2011). The fourth section builds on the empirical and theoretical understanding of transnational innovation policy and gender mainstreaming.

Situating Canada and Sweden within the context of the OECD contributes a nuanced understanding of how ideas and innovation norms transfer across member states (Carroll & Kellow, 2011; Mahon & McBride, 2008). This section also examines the work of the OECD (Woodward, 2009) and the political opportunity structures that contribute to the OECD's approach to gender equality and innovation policy (Chappell, 2002). This chapter concludes with evidence-based policy recommendations (Hankivsky, 2013). The contributions to knowledge in this chapter are empirical and theoretical in nature.

Empirically, interview data collected across cases is coded and organized thematically, providing the first gender-equality-focused comparison of national innovation policies from 2000 to 2014 in Canada and Sweden. Theoretically, this chapter contributes to the understanding of gender equality and innovation policy through the theoretical lens of political opportunity structures (Chappell, 2002). In addition, this chapter contributes to the body of knowledge on the structure and function of the OECD in the field of gender and innovation.

### **Framing Innovation Policy through a Gender Lens**

At the national level innovation policy includes measures to stimulate innovation as well as mitigate the effects of technological and social change. Innovation policy spans a variety of government ministries including education, research, employment and labour market policy. Many of the policies that are integral to creating an innovative society are not labelled specifically as being within the domain of innovation policy. Thus explaining innovation policy through a gender lens requires a broader understanding of women's

relationship to the welfare state and economic markets. The differences in welfare state configuration in Canada and Sweden shape employment opportunities, as well as the consequences of unemployment and self-employment in the social democratic and liberal welfare states respectively (Esping-Andersen, 1990; Orloff, 1993). As Orloff demonstrates, “Gender is not an attribute of individuals but a social relationship, historically varying, and encompassing elements of labor, power, emotion, and language; it crosses individual subjectivities, institutions, culture, and language” (Orloff, 2009, p. 318). A gender-conscious conceptualization of innovation policy considers the complex ways that labor, power and institutions shape the language of innovation policy and the objectives of the state in implementing policy measures.

National innovation policies are subject to regional dynamics as well as international agreements. Innovation policies in Canada and Sweden have developed in relation to the internationalization of economic markets. Sweden’s accession to the European Union and Canada’s adoption of the North American Free Trade Agreement (NAFTA) are important elements of the innovation policy landscape. The opportunity presented by access to larger markets, on the one hand, drives innovation; however, outsourcing may have a negative impact on talent development and job retention. Prior to Canada adopting NAFTA and Sweden entering the EU, the internationalization of both economies was met with resistance from feminist groups. The vulnerability of women’s employment and welfare state protection under these international agreements undermines the narrative of opportunity equated with a larger economic base (Cameron &

Gonas, 1999). In Canada, NAFTA has resulted in changes to the labour market that impact male- and female-dominated sectors of the economy differently. Women represent only a small fraction of those impacted in the loss of manufacturing jobs. However, changes in the service sector have contributed to job losses that disproportionately impact women (Cameron & Gonas, 1999). The contraction of certain sectors in the economy is an important subtext in the innovation discourse. As sectors contract and outsource, they are less likely to engage in innovation in the country of origin; thus innovation is moved to the site of production.

In Canada and Sweden, the supply of available talent willing and able to engage in innovation-related work is contingent on a number of variables within the labour market. A gender-conscious perspective highlights labour market segregation as a significant variable that negatively influences the supply of women available to engage in innovation work. Women's career patterns are more likely to be divergent from innovation-intensive sectors of the economy. Due to labour market segregation, women are also more likely to innovate in sectors of the economy such as health, education, and the service sector (Wallin, 2012). In Sweden, the dual-career model combined with the welfare state has produced very high levels of gender equality in society. However, disincentives in the labour market discourage entrepreneurial activity. Henrekson (2005, 2006) argues that mature welfare states like Sweden were never designed with the objective of generating innovation, and thus welfare states may inadvertently produce disincentives to engage in self-employment and risk-taking. The combination of benefits

and opportunity costs associated with self-employment may produce disincentives to taking entrepreneurial risks. The welfare state in Sweden offers superior benefits to women who are employed in the public sector in comparison to women on entrepreneurial career paths, particularly when the opportunity cost of hiring replacement staff while on maternity leave is taken into consideration for entrepreneurs. In Canada, a range of social benefits are contingent on employment status. Self-employed people may opt into employment insurance schemes; however, the cost of doing so may be prohibitive for many entrepreneurs and thus employment in a company or government job is seen as preferable when a choice exists. Entrepreneurship research has also explored the relationship between self-employment and oppression of women; when women engage in entrepreneurial activity they are often segregated at the low end of the labour market, providing low-cost services that require little to no startup capital (Ahl, 2004). There is a duality in entrepreneurship, in that it can offer tremendous freedom, self-actualization, and creativity provided that it is undertaken by choice and not economic necessity. Entrepreneurship literature in many cases has failed to adequately address the tensions that exist for entrepreneurs, when this form of employment is not an active choice, but rather a response to failures in the labour market (Ahl, 2004).

Entrepreneurship is just one aspect of innovation-related work. Other aspects include research, product development and process development, which may take place within the context of a university or an existing firm. There is a need to re-imagine this incentive structure and recognize that current policies support innovations that fit

traditional masculine structures, models and norms (UNCTAD, 2013). Therefore women's decisions to take public sector employment over self-employment or employment in the private sector may be influenced by the perception that benefits are superior in standard employment versus self-employment. In tandem with a perceived or actual reduction in benefits, women may also find that innovation resources are less accessible to them. The policy direction pursued by governments has created an environment where women self-select or opt out of entrepreneurial and research-based career paths at higher rates than men. The predominant approach to innovation policy is that large-scale investment is preferable to smaller investments, scalability of enterprises is ranked above depth of change, and technological innovation is prioritized over non-technical innovation (Bedell, 2014). As a result of implicit bias, policy initiatives have created an innovation system that is not gender-blind but highly gendered in both Canada and Sweden. The gendered implications of the boundaries that have been drawn in the innovation space are particularly challenging given the dominant and deeply held belief that innovation must look and feel a certain way (Andersson et al., 2012). Internationally, the OECD is advocating for more open innovation policies. These policies would allow for a wider range of actors that do not currently fit within traditional innovation norms to enter the innovation discourse, promoting disruptive change. OECD objectives, however, may be divergent from national interests in innovation policy-making.

In Canada and Sweden, the rationale for innovation policy may be political, legal, scientific or economic in nature (Gregersen, 2010). The public sector can set the pace for

innovation through the instrumental use of policy measures. The standard for innovation policy has evolved from Schumpeter's linear model, which focused on the commercialization of research, to the current emphasis on a more holistic approach (Edquist, 2014; Godin, 2006). The holistic approach to innovation policy includes both supply-side and demand-side measures. The holistic approach acknowledges the utility of better policy coordination across administrative silos and policy portfolios given the overlap between innovation policy and other policy areas (Woiceshyn & Eriksson, 2014). There are gendered implications on both the supply and demand side of innovation policy. On the supply side, grants and R&D funding are strongly correlated with industries that fit masculine norms of innovation, such as the automotive, aerospace, and natural resource extraction industries (Bedell, 2014). However, a gender-conscious approach to innovation shifts away from specific industries to a holistic perspective: On the demand side, governments have mechanisms to stimulate innovation, through procurement programs, supporting technologies before they are commercially viable. However, these strategies are typically employed in very high-cost, large-scale innovation projects when it is advantageous to share risk with the public sector. In many cases, innovations that are smaller in scale and deal with social innovation, rather than technological innovation, do not meet the requirements for government procurement programs.

Framing innovation policy through a gender lens has implications for advocacy and engagement. Chappell (2002) argues that the relationship between feminists and institutions is "co-constitutive," in this process, agents and structures are engaged in a

continual process of information-sharing that shapes political opportunity structures (Chappell, 2002, p. 4). The formal recognition by states such as Sweden that diversity and intersectionality of race, class, religion, gender and sex contribute to innovative thinking enriches the policy debate. This recognition opens opportunity for dialogue with innovators that defy masculine innovation norms.

### **Historical Trajectories and the Development of National Innovation Systems**

The concept of national systems of innovation was developed to expand the theoretical understanding of how countries organize to create innovation (Edquist & Lundvall, 1993, Freeman, 1995; Lundvall, 2010;). This approach may be viewed in opposition to other theoretical models, or as an umbrella under which other models fall. For the purpose of this case study, the national systems of innovation approach is a useful conceptual umbrella to understand the policy context in both Canada and Sweden. This section of the analysis takes a broader view of the national policy context in constructing the comparative analysis. The national systems of innovation approach is pivotal to the understanding of how learning takes place within a country, both to build the policy framework for innovation and to create the necessary feedback for the evolution of learning at the individual, firm, and systems level. The approach is predicated on an assumption that “knowledge is the most fundamental resource in the modern economy, learning is socially embedded and culturally contextual, and the traditional role of the nation-state in supporting learning is now being challenged by globalization and internationalization” (Lundvall, 2010, p. 2). Although globalization and

internationalization are important social forces, the nation-state is at the centre of the model because the state plays an important role in protecting citizens from the negative consequences of innovation. The distribution of benefits from innovation is often unequally shared, creating regional disparities and class divides within countries (Lundvall, 2010). It is the responsibility of state institutions to create political and administrative mechanisms to mitigate the changing social and economic effects of innovation. Thus, there is a danger in the globalization of innovation, without equal support for international systems to mitigate its impact (Lundvall, 2010). The concept of national innovation systems has evolved to include learning within institutions and relationships between firms and customers, building on research which indicates that the vast majority of innovation is incremental. At its core, “The theory of national systems of innovation (NSI’s) tries to explain different growth rates in various countries on the basis of national performance in production and adoption of innovation” (Niosi et al., 2000, p. 3). Globally, countries are at different levels of development in the creation of national innovation systems depending on population, industrialization, and wealth (Huyer, 2015). Canada and Sweden fall into the category of smaller high-income countries because of their relatively small populations in comparison to the largest innovators, such as the United States, Japan, and Germany. These small countries are classed as high-income, however, because they still produce high levels of GDP in comparison to other countries with similar population sizes (Nelson, 1993). Much of the literature on national systems of innovation has been developed in the Nordic countries, and to some degree the

learning that takes places in the context of national innovation systems is premised on the existence of a relatively homogenous society (Lundvall, 2010). This points to the challenge of understanding ethnic diversity as well as gender equality within innovation systems. To date, much of the systems learning has not given adequate attention to gendered learning and the role of women's exclusion from innovation spaces in shaping systemic learning patterns.

Key industries that shape a nation's transition from the pre-industrial era to industrialization are formative in determining the nature and structure of the national innovation system (Edquist & Lundvall, 1993). The transition in Sweden emerged from the mining, forestry, iron and steel industries and not the area of agriculture: "In particular, the engineering industry became—and still is—a strategic sector for the modernization of the Swedish economy around the turn of the century" (Edquist & Lundvall, 1993, p. 271). The relevance of the engineering industry shaped the initial design of the national innovation system in Sweden. The Swedish system was initially designed to support a smaller number of large national companies with strong corporatist roots. A small number of large multinational firms such as Ericsson, Volvo and Saab formed the foundation of innovation in Sweden. This approach to innovation emphasized entrepreneurship within the context of large firms, and collaboration between academic research institutions and companies, rather than entrepreneurial firm formation.

Much has changed in the last 20 years, as ties between multinational firms and the Swedish state have eroded. Increasing globalization and outsourcing of manufacturing

jobs to more cost-efficient locations has eroded corporatist ties between multinational firms and the state. The Swedish economy has relied on large firms for job creation and innovation. Thus the changing relationship between the state and large firms has had a fundamental impact on the new direction of innovation policy in Sweden. This evolution has prompted a shift from a singular focus on large firms to a renewed interest in small and medium sized enterprises. In particular, there is a new focus on stimulating innovation beyond the national innovation hub in the greater Stockholm area to regional centres, and a more holistic approach in general (Edquist, 2014).

The trajectory of the national innovation system in Canada has evolved quite differently than in Sweden, principally because of the close proximity and high degree of industrial integration with the United States. The innovation system in Canada has historically been dominated by small and medium sized enterprises, compared to larger multinational firms in Sweden. In Canada, industries such as auto manufacturing are highly integrated with the United States. One of the vulnerabilities of the Canadian economy is that innovations developed in Canada are often produced south of the border, thus reducing the positive economic impact of innovation on the Canadian economy (McFetridge, 1993). The size of the country and the composition of the land are important factors in how the system has evolved. McFetridge (1993), argues that Canada is unique because of the country's small population, large geographic territory, and close economic ties with the United States. The unique nature of the national innovation system in Canada is also shaped by the strengths of each of the provinces. Ontario and Quebec receive the

largest proportion of innovation funding from the federal government. More recently, Alberta, Saskatchewan, and British Columbia have all developed significant areas of innovation expertise (Woiceshyn & Eriksson. 2014). Oil in Alberta, bio-technology in Saskatchewan, and medical research in British Columbia have generated significant innovation activity. Although it may appear that each of the provinces has developed its innovation program along separate paths, it is important to consider that, many Canadian companies operate throughout the country and share R&D and business operations across provincial boundaries (Niosi et al., 2000). The seemingly different trajectories that have developed highlight the relevance of provincial governments as innovation leaders. However, regions are often too small to sustain purely regional research and development programs, and the largest research granting programs are operated federally (Niosi et al., 2000). The potential for the creation and diffusion of innovation across provincial boundaries may be facilitated by strengthening national policy objectives.

In both cases, industries that are prominent in the historical development of national innovation systems have traditionally excluded women. The importance of path dependency in the evolution of national innovation systems should not be overlooked in the present institutional framework. Pierson (2000) asserts that once a country or a region starts down a particular path, the cost of reversing a particular decision increases. Thus the cost of reconceptualizing innovation at the institutional level to adapt to gender equality norms is prohibitive. Liebowitz and Margolis (1995) challenge the concept of path dependence in the field of technological innovation, and assert that the market has

built-in corrective measures that reverse sub-optimal choices. However these market mechanisms do not apply to the public sector institutions responsible for generating innovation policy (Pierson, 2000). Historical institutionalism suggests that the reasons institutions persist are not necessarily congruent with the reasons they were created (Thelen, 2003, 2004). Furthermore, in the absence of a critical juncture shifting innovation systems towards diversity, the status quo remains (Waylen, 2011).

### **The Politics of Innovation Policy in Canada and Sweden**

The ideologies of political parties have contributed to the different historical approaches to innovation policy pursued by government in Canada and Sweden. The historical evolution of government intervention in innovation policy in Canada from the 1960s forward has been described by Doern and Stoney as a combination of benign and intentional neglect (2009). The key difference in approaches taken by the Liberal and Conservative parties in Canada is consistent with political ideology concerning the role of the private sector in the economy. The Liberal government has historically sought a stronger role for government in innovation policy formation than has the Conservative party. The approach taken by the Conservative party has been to limit government spending on innovation, thus reallocating responsibility for innovation spending to the private sector (Doern & Stoney, 2009). In Sweden the Social Democratic party in power in 2004 focused on innovation policy as a way to secure Sweden's role as a leader in the development of knowledge-based economies in Europe (Marttila, 2013). The strength of the knowledge-based economy could attract foreign investment and generate wealth to

sustain the welfare state (Marttila, 2013). The Moderate Party under Prime Minister Frederick Reinfeldt introduced the Swedish Innovation Strategy 2012 as part of a larger series of reforms within the Swedish economy. Reinfeldt's government committed to reducing taxes in Sweden and stimulating job creation during his government's second term. The innovation strategy flowed from a larger series of promises. The comparison between Canada and Sweden highlights that the most centre-right of political parties, the Conservative Party of Canada, although pro-business, is the least engaged in innovation policy-making. The Liberal party in Canada as well as the Social Democrats and Moderate parties in Sweden have taken an more active role in shaping the national policy framework. The following section examines the specific policy measures taken by the national governments in Canada and Sweden in the period from 2000 to the 2012 launch of the Swedish Innovation Strategy.

The Canadian approach to innovation policy can be divided into two periods, creating a distinction between the leadership of the Liberal and Conservative governments. In 2002, the Liberal Government under Prime Minister Jean Chrétien released two papers, titled *Knowledge Matters: Skills and Learning for Canadians* and *Achieving Excellence Investing in People, Knowledge and Opportunity*. Together these two papers formulated Canada's first national innovation strategy. The strategy was divided into two papers to separate federal and provincial areas of responsibility. Areas of provincial jurisdiction such as education policy are addressed in *Knowledge Matters*. This portion of the national innovation strategy focuses on building human capital

through equality and lifelong learning. Equality measures include improving living standards and educational opportunities for aboriginal Canadians, as well as incorporating new immigrants into the economy. Federal responsibility, as outlined in *Achieving Excellence Investing in People, Knowledge and Opportunity*, is similar to Sweden's 2004 innovation strategy, focusing on the shift to a knowledge-based economy. The Liberal government made explicit the cooperation required by government, universities, and private industry to create opportunities for innovation across the country. The role of the Federal Government is defined through the concept of stewardship, which is the duty to balance the benefits of innovation with the potential adverse effects in the areas of health, environment, and public safety. In 2002, Canada's innovation strategy was arguably ahead of its time in the context of other OECD countries. As an early mover within the OECD, Canada established a tone for ambitious innovation policy with concrete government targets and objectives for research and development investment (R&D) as well as spending on infrastructure. The 2001 Throne Speech and subsequent innovation strategy paved the way for the creation of several important national bodies responsible for implementing the innovation agenda. These institutions included the National Research Council of Canada, a body responsible for facilitating the use of R&D funding and providing information and resources for joint public/private collaboration, and the Canada Foundation for Innovation, an arm's-length organization with the responsibility to fund large scale multi-year innovation infrastructure investments (Doern & Stoney, 2009). Other major research initiatives were also created, including the establishment of the

Canada Research Chairs program, which allowed Canada to attract and retain world-class talent in a variety of research fields.

Although neither of the two policy papers that make up the 2002 strategy addresses gender equality issues explicitly, there is a distinct commitment to equality of opportunity as a precondition of an innovative society. Equality of opportunity for all Canadians, including immigrants, aboriginal peoples, youth, and women is a pillar of the policy strategy outlined in both documents. In *Knowledge Matters*, a commitment to gender equality is reflected in the brief discussion of increased maternity leave provisions as a measure to increase equality of opportunity for all Canadians to participate in innovation-related work. At the same time, the paper also mentions the need to increase master's- and doctoral-level scholarships for women and men within the country, which reflects a commitment to gender equality within the innovation policy agenda by addressing the needs of men and women separately. These examples are relatively minor commitments within the overall strategy; however, they provide a point of reference in the shifting nature of innovation policy in Canada since the election of the Harper Conservative Government in 2005.

In 2005, many of the goals and objectives outlined within the national innovation strategy were abandoned with the change in government from the Liberal to Conservative party, along with the overall commitment to a national innovation strategy. The change in government in 2005 sharply changed the direction that innovation policy took in Canada post-2005, and has led to the end of a formal national innovation strategy. The

conservatives sought cuts to science and research funding, which have stalled innovation in the Canadian case (Doern & Stoney, 2009). In 2004, the Swedish regional development agency Tillväxtverket released a report called *Innovation Policy in Canada: Strategy and Realities*, which compared and contrasted the approaches to national systems of innovation in Sweden and Canada and recommended areas for joint collaboration between the two countries (Liljemark, 2004). In 2002, Canada was arguably ahead of Sweden in the development of a national innovation strategy, and provided a comparative learning opportunity before Sweden launched its first national innovation strategy in 2004. The report highlighted the many similarities between the countries, including high quality of life, good health of citizens, and stable open-governance ideals for conducting business operations. High levels of investment in state-funded mandatory primary and secondary education, as well as strong networks of universities and colleges throughout both countries, are advantageous building blocks for innovation. The report differentiates the objectives of Canada and Sweden on the grounds that Canada's innovation strategy was highly motivated by a lag in productivity in comparison to the United States. Much of the Canadian innovation agenda is shaped around the goal of increasing productivity and narrowing the innovation gap with their neighbour to the south. In 2004, Canada was also more globally oriented than Sweden, and had taken advantage of the opportunity to create a number of strategic research partnerships within Europe, the United States, and Asia: "The Canadian example shows that increased international cooperation is an important ambition in Innovation Policy. Canada strives to balance its naturally strong

relations with the US through efforts to strengthen links both eastward and westward” (Liljemark, 2004, p. 47). In 2004, Sweden released “Innovative Sweden,” arguably Sweden’s first national innovation strategy. The 2004 strategy was a broad attempt to provide policy direction, but was not implemented in practice throughout the country. The chronology of the development of innovation policy in both Canada and Sweden was similar in many respects in the period between 2002 and 2005, with both countries taking proactive approaches to innovation policy with the aim of introducing a national vision.

Neither the 2002 strategy in Canada nor the 2004 strategy in Sweden produced the desired policy outcomes. Interview data indicated that in the lead-up to the 2004 strategy, the Swedish Government did not conduct adequate stakeholder consultation throughout the country, and therefore regions and organizations in the field were not committed to implementing the national innovation strategy. A business leader described, “the paradox of the strong state in Sweden and the independent nature of the Swedes is why the 2004 innovation strategy was unsuccessful. Without consultation, independent and sometimes conflicting goals take precedence over the national policy agenda”- *Swedish CEO*. The absence of consultation also contributed to skepticism around the intentions of the strategy for social innovation in Sweden, “Innovation can be about understanding new ways of thinking and promoting wellbeing but it can also be perceived as part of the neoliberal welfare state and an attempt to withdraw the state from providing public services, it does not have to be this way, but sometimes it is, and people are wary of

policy intentions”-*Swedish Social Innovation Leader*. In the Canadian case, a change in government from the Liberal Party to the Conservative Party in the 2005 election left the innovation strategy on the drawing board. Interview questions on the subject of innovation policy in Canada were often met with more skepticism. In the private sector questions such as, “What policy?”-*Canadian CEO* or statements such as, “We do not have an innovation policy”- *Canadian Academic*, frame the discussion on the role of innovation policy in the Canadian case. Although this period in Canadian politics led to the creation of important academic and research granting agencies, it has become a forgotten part of Canada’s innovation policy leadership internationally. Similarly, both countries experienced a subsequent 10-year lag in innovation policy development that has had a significant impact on the inclusion of women in the innovation space.

### **Gender Equality and Innovation Policy**

In the period from 2002 to 2014, the innovation policy landscape has changed significantly in both Canada and Sweden. A comparative reversal in innovation policy leadership has taken place. In 2002, Canada was a leader in innovation policy development within the OECD; in 2014, Sweden is on the cutting edge of innovation policy development. Sweden has embraced a holistic approach to the design and implementation of a national innovation system. Canada has veered away from a united innovation policy in favour of separate policies for science and technology, university research, private sector research and entrepreneurship (Doern & Stoney, 2009). Two significant documents shape the comparative framework that explains the difference in

policy approaches taken in both cases. The Swedish Innovation Strategy 2012, launched by the Ministry of Enterprise, Energy and Communications, is the government's second attempt at a gender-conscious national innovation strategy. In Canada, the Jenkins Report commissioned by the Conservative government highlights the difference in approaches taken by the two countries. The change in innovation policy priorities in Canada is significant for the inclusion of women in national innovation systems. The following section compares and contrasts the different approaches to a gender-blind and gender inclusive-innovation policy within the two countries.

In 2010, the Canadian Government commissioned an expert panel to review innovation policy. The panel produced a report, "Innovation Canada: A Call to Action Review of Federal Support to Research and Development." The expert panel was led by Tom Jenkins, Chief Strategy Officer of Open Text, Canada's largest independent software company. The Jenkins Report is the most robust attempt to rejuvenate innovation policy in Canada since the Liberal Government's strategy in 2002. The Jenkins report is not an official government strategy or policy position; rather, it is an attempt by government to re-open the stagnant innovation policy portfolio. Thus the comparison with the actionable Swedish innovation policy is imperfect, yet worthwhile, as both documents provide significant insight into the different ways that human capital, gender equality, and innovation are approached in the Canadian and Swedish cases.

A significant point of departure between the Jenkins report and the Swedish innovation strategy is how they define human capital and the role of innovation in society.

The Jenkins report defines the scope of the problem in Canada quite narrowly: “Studies have repeatedly documented that business innovation in Canada lags behind other highly developed countries. This gap is of vital concern because innovation is the ultimate source of the long-term competitiveness of businesses and the quality of life of Canadians” (Jenkins, 2010, p. 3). The Jenkins report is written from a gender-neutral perspective; it acknowledges that the aging baby-boomer population is going to create a smaller workforce and increase the demand for highly skilled workers in Canada. To address this challenge, recommendations are put forward that focus on the attraction and retention of highly skilled immigrants and international students in Canada. While these measures are extremely important, the policy debate is framed in such a way that immigration is the principle human capital solution to Canada’s poor performance in innovation. The report does not contain one reference to key word searches for, “women,” “woman,” “girls,” “gender,” “sex,” or “equality.”

The Jenkins Report is consistent with the conservative government’s approach to innovation, suggesting a reduced emphasis on public sector R&D funding and more attention to private sector engagement in the innovation process. The Jenkins report challenges existing approaches by recommending demand-side engagement from government to generate a market for innovative technologies. Proposed initiatives include increasing government procurement to stimulate innovation. The most sweeping change recommended by the expert panel is the creation of an Industrial Research and Innovation Council (IRIC), with a mandate to support business innovation. If implemented, the IRIC

has the potential to shift innovation policy from a fragmented approach to a more coordinated policy, within the limited scope of business innovation. The recommendations in the Jenkins report submitted to the Conservative government have not been implemented in Canada, and thus there is not a single policy directly comparable to the Swedish Innovation Strategy 2012. From a gender equality perspective, gender mainstreaming in innovation policy is a serious challenge because of the diversity of actors involved in implementation at both the national and subnational levels. Federally, Industry Canada is the key department responsible for science, technology, and small business; however, without a clear innovation agenda there is no accountability for women's inclusion or exclusion from the innovation discourse. The federal department responsible for women, Status of Women Canada, offers several grants and programs for female entrepreneurs that are consistent with the conservative government's instrumental, rather than feminist, approach to women's equality (Bird & Rowe, 2013). However, these programs tend to focus more on women in small business and local entrepreneurship than on innovation. Overall these programs fail to challenge institutional barriers to women's full inclusion in the Canadian economy and in the innovation space specifically (Layne et al., 2010).

The Swedish Innovation Strategy 2012 is organized around six key themes: innovative people, research and higher education for innovation, framework conditions and infrastructure for innovation, innovative businesses and organizations, innovative public services, and innovative regions and environments. Within the six broad themes

equality, is woven throughout the strategy, stating that gender, age, and ethnic or cultural background should not be a barrier to inclusion in education and innovation (Swedish Innovation Strategy, 2012). A key word search of the Swedish Innovation Strategy includes two references to “women,” four references to “gender” and one reference to “equality.” If not quantitatively significant, these references are qualitatively significant, drawing attention to the human side of innovation and creating analytical space to question the underlying norms that motivate policy decisions. The connection between gender equality and innovation policy in Sweden is an intentional and iterative process that reflects cooperation between feminist academics and Vinnova, the Swedish Innovation Agency. Scholars have researched women and innovation in Sweden since the 1980s, and the depth of scholarship is reflected in the gendered understanding on innovation policy put forward by the government (Andersson et al., 2012). Often the objective of reducing stereotypes, be it gender-related or due to other social factors, is seen as a valuable social goal, but not a fundamental prerequisite to an innovative society. This formal policy recognition gives further incentive to break down social barriers to inclusiveness. Attracting diverse voices into the innovation space is also an objective of the Swedish innovation strategy.

Geographically, innovation in Canada and Sweden tends to be concentrated in larger urban centres. There may be valid reasons for this concentration, particularly to take advantage of economies of scale and clusters around certain types of activity (bio-

science, agriculture, finance). The presence of large universities may also factor into the concentration of research intensive innovation programs in urban centres. However, the concentration of innovative thinking is not desirable in the national context: “Innovation thrives in difference and diversity. When people move between workplaces, regions and countries across the world, the opportunity to develop and combine knowledge, skills and experience increases. Innovation and creativity also benefit from meetings and collaboration between people of different genders, ages and ethnic origins” (Swedish Innovation Strategy, 2012, p. 26). Facilitating access to sites of innovation, such as science parks and research universities, for people from different backgrounds is paramount to growing innovative thinking, and the Swedish strategy aims to encourage this. In practice, sites of innovation are dominated by social, educational, and cultural elites in both countries. Interview data across both countries highlights the prestige associated with innovation-related work and the competitive atmosphere that is culturally acceptable in innovation work. While the exclusivity of innovation spaces may be advantageous in certain contexts, it may also act as a barrier to innovation.

The issue of social inequality is not addressed in the Jenkins report, while addressing social inequality is viewed as a fundamental aspect of developing an innovative society in the Swedish case (Swedish Innovation Strategy, 2012). Decreasing social inequality is important to the Swedish definition of innovation. References to social equality are present in the earlier innovation policies espoused by the Liberal party in

Canada in the 2000s; however, the current context does not link these social issues together cohesively. The growing income inequality in Canada is problematic not only for reasons of social cohesion but also for fostering innovation.

### **Transnational Innovation Policy and Gender Mainstreaming**

The Organization for Economic Cooperation and Development (OECD) has pioneered innovation policy globally for decades. How do OECD innovation norms influence the inclusion of women in innovation policy at the national level in Canada and Sweden? In the broadest sense, the OECD is a “purveyor of ideas” (Mahon & McBride, 2008, p. 3). The research capacity of the OECD secretariat is unmatched in many national governments. The strength of OECD research is, as Carroll and Kellow (2011) argue, the ability to bring an economic lens to a range of public policy issues, including health, education, and the environment. In the field of innovation policy, the technical expertise within the OECD has led to the creation of the Frascati and Oslo Manuals, the cornerstones of the OECD’s innovation performance measurement framework. As an organization, the OECD has no direct power to enforce policy within member states; rather, there is a continuous learning and negotiation that takes place through country reviews, meetings, and OECD reports (Carroll & Kellow, 2011,). The Directorate for Science, Technology and Innovation, located within the headquarters in Paris, is a key conduit for information sharing and organizational learning between member states on the development and implementation of innovation research. The policy process is dynamic

and continuously evolving, with each member state engaging with the OECD at different times and on unique terms based on each state's need for information and collaboration with the organization.

Woodward (2009) organizes the work of the OECD into four categories: 1) Cognitive, including intergovernmental relations and shared objectives; 2) Normative, the capacity to produce and propagate research and ideas; 3) Legal, international law created in OECD decisions; and 4) Palliative, "a lubricant to the wider processes of global governance" (Menzies, 2012, p. 600; Woodward, 2009, p. 6). The OECD's role in innovation policy is primarily normative: Its power to produce and propagate ideas through the process of peer review provides the organization with significant authority. Member states work with OECD staff to initiate reports and analysis conducted on their behalf. Countries often use OECD research as a catalyst to raise issues in a comparative perspective and generate momentum on domestic policy issues. Leading up to the release of the 2012 Swedish Innovation Strategy, the Swedish Government worked very closely with the OECD to conduct research and analysis that provided an external perspective on the government's proposed policy direction.

Since the OECD began to work on innovation policy in the 1980s, the organization has progressively liberalized the concept of innovation and broadened the scope of what innovation includes. The definition has moved from technological innovation to include service innovation, process innovation, and social innovation. The Swedish innovation strategy reflects the widening of the OECD's innovation agenda. The

OECD has praised Sweden considerably for the progressive and holistic approach to innovation policy pursued in the most recent strategy. However, even as Sweden is praised for best practices, the country has also taken a considerable number of policy steps that are at odds with other aspects of OECD policy but fit strongly with domestic political realities. The commitment to gender equality in the Swedish innovation strategy is one such contradiction, gender equality is a national priority in Sweden rather than a norm shared through innovation policy diffusion in the OECD.

Canada has not engaged with the OECD on innovation policy with the same degree of attention as Sweden. Two key variables differ in the Canadian case. The first is the absence of domestic pressure to develop a national innovation strategy. Without popular support for innovation policy-making, there is no need to involve the OECD in conducting innovation policy reviews at the national level. The second variable is the Conservative government's arm's-length approach to innovation policy more broadly. Decreasing government's role in innovation policy-making has also reduced engagement between Canada and the OECD on the innovation policy file. The difference in approaches to engaging with the OECD at the country level is one reason that OECD influence on innovation policy differs across cases. The second reason that OECD innovation norms are adopted differently across countries is the configuration of the OECD itself.

The OECD is a highly networked organization, both internally and externally (Pal, 2012). There is not one OECD but many, and the size of the organization and the

administrative silos that exist within the OECD create contradictions in recommendations across directorates. These silos become visible in the process of merging different information on gender equality and innovation, respectively. In addition to policy leadership on innovation, the OECD is also a significant source of data and best practices on gender equality. Most recently, the OECD Gender Gap Report is one such example of gender equality leadership. The Gender Gap Initiative is a priority project of the OECD. The Gender Gap Report, produced in 2013, is an evidence-based call to action, advocating gender mainstreaming across policy portfolios within member states. This comprehensive report brings together the best available data and generates a body of evidence on the economic impact of gender inequality. Themes covered in the report include education, entrepreneurship, labour force participation, and financial literacy. The challenge that has emerged within the OECD is mainstreaming the Gender Gap recommendations within other departments. The organizational separation between gender equality work and innovation work has practical implications within the organization and across member states. When policy is layered within organizational silos, information-sharing is complex. In 2013, the OECD Directorate for Science, Technology and Innovation had not yet taken on the recommendations from the Gender Gap Report with regard to innovation. This is in part because of the difference in organizational mission statements and constituents for the research produced by organizational units. In the innovation directorate, there is some interest in gender issues; however, they are not at the core of the directorate's work. Similarly, there is not enough

upward pressure from member states to include gender mainstreaming in the work of the Directorate for Science, Technology and Innovation. The implications of the silos within the OECD are significant for gender equality issues in innovation policy at the national level. Several questions emerge from interviews about the dissemination of gender equality norms across organizational silos within the OECD and across member states. Why does Sweden mainstream innovation and gender equality when the OECD does not? Conversely, if the OECD is a conduit for best practices in innovation policy, how has gender mainstreaming in Swedish innovation policy failed to be included in OECD innovation reviews? These questions are answered by exploring how innovation norms and gender norms are shared differently across member states. The separation between gender equality and innovation has been bridged in the Swedish case, however the silos within the OECD prevent the dissemination of gender equality in innovation as a best practice throughout the organization's member states.

To be better understand the process of information-sharing on gender equality and innovation best practices, it is important to understand how OECD teams gather information while conducting country reviews. Mahon (2008) provides insight into the process of gendering policy issues across OECD member states in a study on women, employment and childcare. Mahon found that gendering policy issues is a process that takes places when OECD research teams travel from country to country, picking up different aspects of policy issues as the team's work evolves (Mahon, 2008). In a comparative study of Japan and Sweden, OECD officials changed their perspective on

women and unpaid work as they moved across cases (Mahon, 2008). Why has the process of gendering policy succeeded in this study and not in the case of innovation policy? By the end of 2014, 19 of the OECD's 34 member states had at least one review of innovation policy conducted by the organization; some members such as Korea and Mexico have had as many as two reviews. Neither Canada nor the United States have ever sought a comprehensive review of innovation policy by the OECD. A similar gendered learning process has not yet taken place in the process of innovation country reviews. To understand why gender and innovation remain in separate silos, it is important to consider political opportunity structures within Canada, Sweden and the OECD (Chappell, 2002). Neo-institutionalist political opportunity structures are dependent upon endogenous factors (Chappell, 2002). In the interviews conducted at the OECD, officials suggested that in the case of gender mainstreaming in innovation policy, these endogenous factors include the presence of feminists in the bureaucracy (femocrats) active within the OECD. The Gender Gap Report is evidence of women using the institutional framework of the OECD to generate evidence-based policy recommendations in support of women's social, educational, and economic advancement across member states. Officials from the Directorate for Science Technology and Innovation confirmed that the OECD team conducting the review of innovation policy in 2012 in Sweden, had not incorporated the work of the Gender Gap project into their review process. As a result the team did not ask any questions related to gender equality and innovation policy. The OECD team also noted that Swedish officials who participated

in the OECD innovation policy review did not bring up gender equality as a factor in innovation policy-making in Sweden. The findings that emerge from the interview data at the OECD may be explained by observations made by officials in the Swedish Innovation Agency that gender equality is championed within the Swedish innovation agency in pockets, taken up by interested individuals, rather than understood in a uniform way across the organization. The literature by Andersson et al, 2012 also confirms this hypothesis that gender consciousness in the Swedish innovation agency is not necessarily uniform across organizational units. Thus one possible explanation for the absence of information on gender equality in the OECD review of Swedish innovation policy is that gender-conscious leaders were not included in the review process. Alternatively, the relevance of gender equality to innovation in the Swedish case may be taken for granted. In the case of innovation policy, the OECD has not been an effective conduit for sharing information on the importance of gender equality to building and growing national innovation systems. At the national level, government departments responsible for women's issues and gender equality are the constituent ministries for OECD gender reports such as the Gender Gap paper. These government departments are not influential in the development of innovation policies and agenda setting. Concurrently, government departments responsible for finance, business development, economic growth and education are the targeted audience of OECD innovation reviews. These departments have yet to prioritize gender equality in their core business structures in both Canada and

Sweden. Thus there is no upward pressure on the OECD to include gender-conscious policy analysis and recommendations in the core of the organization's innovation work.

### **Policy Recommendations**

The proposed policy recommendations that emerge from this research are divided into three themes: breaking down organizational silos, educating innovation leaders on gender equality, and committing to gender-inclusive national innovation policies. These themes provide a framework for advice and recommendations that are specific to the challenges in each of the cases and facilitate learning across cases. Breaking down organizational silos in Canada, Sweden and the OECD is a pivotal factor in creating the conditions necessary for equality in innovation policy. The research capacity and technical expertise of innovation experts in all three cases are profound. However, without creating opportunities for institutional dialogue on the subject of gender equality and innovation, there is little opportunity to use existing research capacity to its full potential. The OECD's capacity to innovate is limited by the interest of member states and the agendas set by working committees (Pal, 2012). However, as Carroll and Kellow suggest, the power of "sunshine" is one the OECD's most persuasive assets (2011, p. 6). As an international organization, the OECD is a trendsetter in innovation policy. The OECD can provide significant leadership on gender equality and innovation by simply discussing it. As an example of the simple but concrete actions needed to break down silos, the OECD could host an innovation policy conference on the theme of gender equality in innovation. A targeted OECD conference would provide the opportunity to

work across organizational silos and draw on the expertise and social networks of officials in a variety of departments. Hosting a conference at the OECD would create a unique opportunity to bring together innovation policy and gender policy experts across 34 member states in one venue. This international event may also help to bridge divisions within national governments that are otherwise difficult to overcome. Even in Sweden, where gender equality is recognized in the national innovation strategy, real administrative silos exist that prevent best practices from moving across national and regional boundaries. In Sweden, vertical and horizontal integration of innovation policy objectives is needed to ensure that gender equality in innovation spaces becomes a reality rather an aspiration. In Canada, the organizational silos that are blocking the integration of innovation and gender equality are more pronounced than in Sweden or the OECD; thus the recommendations are more robust. In the Canadian case a national roundtable on gender equality and innovation is needed to bring together innovation policy and gender equality experts from all provinces and territories. A focusing event is the starting point for engaging in a dialogue about which strategies are currently employed in different jurisdictions as well as different government departments and provincial ministries.

In a comparative case study on the effectiveness of gender mainstreaming in five countries including Canada and Sweden, Hankivsky (2013) found that a lack of dual experts is a significant factor in the failure of many gender mainstreaming programs. Governments have difficulty finding individuals with a duality expertise in gender mainstreaming and technical expertise in policy areas, and thus it is difficult to develop

concrete action plans that are theoretically grounded and practically feasible. There are few people in positions of power in male-dominated innovation spaces in Canada, Sweden, and the OECD who have a technical knowledge of both innovation policy and gender mainstreaming to bridge this knowledge gap. As Hankivsky states, “It is generally accepted that the goal of GM is to transform the mainstream and engender gender equality—for both women and men—across all policies and programs” (Hankivsky, 2013, p. 632). However, the technical expertise to do this in the domain of innovation policy in a way that promotes excellence and drives discovery requires investment. In the Swedish case, Vinnova has invested in building relationships with academics who have expertise in gender equality and innovation. Vinnova could expand this collaboration to include a role for practitioners to provide perspectives on best practices and act as peer educators. In Canada, educating innovation policy-makers on gender equality issues needs to become a national priority. Developing the type of collaborative networks that exist in Sweden between academic experts and policy-makers is an important part of the process of creating an educated workforce capable of making gender-conscious change in innovation spaces. Industry Canada, in partnership with Status of Women Canada, should set a goal to publish an edited anthology similar to that produced by Andersson et al. (2012) in Sweden on promoting gender-conscious policies, practices and procedures in Canada.

Finally, the third policy recommendation is to commit to a gender-conscious national innovation policy. Sweden has already taken the first steps in this direction with

the 2004 and 2012 national innovation strategies. The key recommendation in Sweden is to continue to strengthen the language around gender equality in future strategies and ensure that gender equality remains at the core of innovation policy development. Canada must develop a gender-conscious national innovation strategy. Without a national innovation strategy, Canada is at a significant disadvantage when trying to implement gender-inclusive policy objectives. As Meier and Celis (2011) found in Belgium, gender mainstreaming without clear policy objectives is a technocratic task that is destined for failure. In Canada, the federal government must work with provinces to develop a vision for what an innovative Canada should look like, and develop the necessary policy structures to ensure that women and men have equal opportunity to engage in this policy conversation.

## **Conclusion**

The themes explored in this chapter compare and contrast data from qualitative interviews with formal innovation policy documents in both Canada and Sweden. Sweden is a clear leader in the formal introduction of policy measures to address gender equality issues in innovation-related work within the OECD. Generating an official position on the inclusion of gender equality in innovation policy sends a strong message from the national government to stakeholder groups throughout the country that equality is a priority in the field. The division of powers in the Canadian case between provinces and the federal government, along with the absence of a national innovation strategy, create layers of complexity in the Canadian case. The OECD has considerable expertise

in both innovation and gender mainstreaming; however, organizational silos hinder the smooth transmission of information and ideas across administrative units and member states. The formal policies explored in this section provide the foundation for the subsequent chapters exploring performance measurement and resource allocation.

## **CHAPTER 5**

### **CHAPTER 5: Measuring Performance in Innovation Systems with a Gender Lens**

#### **Introduction**

Performance measurement is an important aspect of the underlying framework that defines the innovation discourse within the context of national innovation systems (Carlsson et al., 2002). Performance measurement broadly evolves from the policy goals set by institutions and organizations from the international to the community level. Systematic collection of quantitative and qualitative data on the performance and inclusion of women within different national innovation systems is rare. The variability in data collection procedures at different levels of government has implications for performance measurement and program evaluation nationally and internationally. Performance measurement research addresses two key dimensions: firstly, how a policy may be measured against the goals it sets out to attain, and secondly, the actual impact of the policy on the ground (Parsons, 1995). The express purpose of the Swedish Innovation Strategy (2012) is to create a more innovative society, one capable of economic growth as well as improving the quality of life for people in Sweden through scientific and technological advancement (Edquist, 2014). The absence of a single national innovation policy in Canada renders the goals and performance measures more difficult to define. It may be argued the Canadian system is more focused on technological advancement than on creating a holistic culture of innovation within the country, in part because of the

regional diversity in innovation patterns (Wolfe & Bradford, 2013). The historical role of the OECD has been to shape innovation performance measurement through the use of innovation indicators in the Frascati and Oslo Manuals (Epstein, Manzoni, & Davila, 2010). Indicators relating to gross domestic product (GDP), patent applications and R&D investment have contributed to cross-national comparison of innovation systems (Archibugi & Filippetti, 2015; Epstein, Manzoni, & Davila, 2010). The objective of these comparative performance measures is to determine which countries are more innovative and more likely to produce new firms and disseminate technological advancements currently and in the future. This process is becoming increasingly complex, as flows of information and innovation are changing. With firms based in countries like Sweden and Canada investing in research into offshore development, and consumers purchasing innovations originating in developing countries, measuring capacity to innovate is becoming increasingly complex (Archibugi & Filippetti, 2015). Performance measurement in national innovation systems is designed to be gender-blind, focusing on excellence and newness as objective measure of innovation. However performance measures are gendered in ways that represent a taken-for-granted, gendered understating of what constitutes effective performance. The innovation metrics commonly used by the OECD are not conducive to understanding how gender equality influences the capacity to innovate. Research by Crowden (2003) and Pouragheli and Beckton (2013) has focused on the inability of OECD innovation indicators to capture gender inequalities in innovation processes in Canada. Quantitative indicators alone do not capture the ways in

which gender is a performance measure and a variable in performance measurement within national innovation systems.

The tradition of scholarship in new institutionalism (NI) and feminist institutionalism (FI) seeks to make the invisible, visible by illuminating what Chappell and Waylen (2013) describe as the hidden life of institutions. This chapter contributes to the FI literature by providing empirical insight into the informal “rules of the game” that govern performance measurement in national innovation systems in Canada and Sweden (Mackay, Kenny, & Chappell, 2010). The following chapter begins with a historical account of women in innovation in Canada and Sweden. This brief history illuminates women’s contribution to innovation, as well as the historic divide between public and private contributions in innovation spaces. The second section draws on interview data, and explores the role of stereotypes in shaping informal performance measures within national innovation systems in Canada and Sweden (Beckwith, 2010). This section also looks at differences in perceptions about masculinity and femininity in innovation spaces in academia and the public and private sectors. The third part of the chapter takes on the disruptive power of gender equality on corporate boards (Chappell & Waylen, 2013). This section focuses on the empirical relationship between board diversity and increased innovation at the organizational level (Woolley et al., 2010). The fourth section focuses on data collection and the role of quantitative measures in shaping perceptions about gender in innovation work cross-nationally, focusing on the role of OECD performance

measurement. The chapter concludes with performance measurement recommendations, drawing attention to social justice as an indicator of inclusive innovation systems.

### **The History of Women in Innovation and Performance Measurement**

Performance measurement, in the broadest sense, is developed based on a collective sense of ideals and norms. Some measures are labelled as important, while others are not. The historical context in which innovation takes place also shapes performance measurement. Canadian and Swedish women have long been innovators and inventors of new technologies: in many cases, feminist technologies that empower women to live better lives (Layne et al., 2010). However, history has had a long and complex relationship with women's scientific advancement and innovation, which is an important consideration in the development of modern performance measurement (Vare & Ptacek, 1988). As Vare and Ptacek (1988) argue, history has a long tradition of excluding women from scientific spaces, dating back to ancient Athens where women were forbidden from studying medicine and physics. The historic exclusion of women from knowledge spaces has also shaped the stereotypes that have influenced the modern hierarchy about what is desirable in the innovation space. Inventions tailored to solving problems of a domestic nature, such as those relating to sewing, cooking, childcare, and nursing, are often labelled less prestigious than those which solve problems that arise outside of the home (Macdonald, 1992).

The history of invention and innovation is rich with contributions made by women from around the world. Feminist research documents the lives of women behind many

well-known innovations. These inventions include established products such as the cotton gin, bloomers, pantyhose, drip coffee, and disposable diapers (Bedell, 2014; Jaffe, 2003; Macdonald, 1992; Vare & Ptacek, 1988). The first Swedish women inventor was Maria Christina Bruhn, who developed a method to safely store gunpowder for the Swedish military. Bruhn spent 13 years seeking recognition for her invention from 1774 to 1787 while many men took credit for its invention. However, in 1787 Bruhn was awarded a substantial prize (equivalent to 3000 Kronor) by the Swedish military in recognition of her efforts (Selivanova, 2014). The first Canadian woman to hold a patent was Ruth Adams, who in 1854 registered a patent in Ontario for the Reverse Cooking Stove. Like many female inventors, neither Bruhn nor Adams are household names. The phenomenon of “forgotten women” within the innovation space was an early challenge in the field of performance measurement. Many of the people who went on to claim credit for women’s inventions had illustrious careers, while the true inventors were lost in the larger narrative. Historically, many women were not present on their own patent applications; women often registered patents under their husband’s name, and therefore many well-known innovations developed by women are not credited to them (Macdonald, 1992). Women who defied traditional gender roles may also have concealed their identity by using their husband’s names publicly to protect their privacy, and historically women were forbidden from registering a patents in their own names (Burk, 2011). The recognition that male inventors received has contributed culturally to the belief that men are more innovative. Modern systems of registering patents reinforce gendered

stereotypes around the creation of knowledge and ownership of thought in the innovation process (Burk, 2011). These ideas have shaped centuries of performance measurement geared towards masculine norms that privilege the creation of inventions that are more masculine and less domestic in nature (Macdonald, 1992).

### **Gendered Stereotypes and Performance Measurement**

Leaders in Canada and Sweden discuss the role of gender stereotypes in innovation-related work in complex and paradoxical ways. The qualities attributed to men and women vary over time and space. As Beckwith (2010) asserts, interpretations of gender have multiple layers: “These meanings emerge from stereotypes about male and female behaviour; from characteristics and behaviours conventionally associated with women and men; from normative assumptions about appropriate behaviour of men and women; from assumptions about biological difference; and from social structures of power and difference” (Beckwith, 2010, p. 160). The absence of data on women in many innovation spaces highlights the importance of challenging stereotypes and unconscious bias through quantitative and qualitative research. Ahl (2004) explains different ways that gender stereotypes define how women’s and men’s entrepreneurial ventures are categorized; these dichotomies are also relevant to innovation work. Two extremes emerge in the literature. The first is the successful entrepreneur, “(who is not feminine), who is detached, rational, calculative, bold, decisive, aggressive, and result-oriented” (Ahl, 2004, p. 129). The feminine model is the opposite of that: “modest in goals, weak in expertise, irrational, (does not use experts or hire trained personnel),

unassertive, and emotional” (Ahl, 2004, p. 129). The attribution of masculinity and femininity to these different business models does not necessarily reflect the gender identity of the founder, but rather expectations about the correct way to be successful in innovation-related work. These stereotypes about the correct way to engage in innovation-related work take on different forms across cases.

In the interview data from the Swedish case, male leaders were conscious that gender impacts performance measurement, in particular on three measures: numeric representation, perception of risk, and merit. All of the Swedish men interviewed were conscious that women are underrepresented in innovation spaces in academia and the private sector, and equally represented in government. Men in Sweden reported that women were underrepresented in their organizations, as CEOs of startup firms, academic research professors, and as board members. Men were consistent in the refrain that there should be more women in innovation spaces, and the challenge of connecting gender consciousness to innovation work was best described by a male government official, “Innovation is a mindset, it is not a product of service. The task we have is to strengthen this mindset. The greatest barrier to thinking outside of the box is stereotype norms and the most common stereotype norm is gender male or female. In any organization you can be more creative by using gender glasses to challenge stereotype norms”- *Swedish Government Official*. However, there is less certainty among the sample of male leaders about how to resolve the issue of women’s numeric underrepresentation in innovation spaces, the absence of women in innovation spaces was described at times as a, “mystery”

or “a lack of interest,” by leaders in the private sector. The second performance measure that was frequently discussed by Swedish men was risk and the perception that women are less willing to take risks in innovation. This perception was balanced with the frequent assertion that women take more calculated risks, and thus when they do risk they are more likely to be successful. However, the reluctance to accept risk discussed by male leaders must be contextualized within a masculine innovation system that prioritizes economic growth over sustainability. The concept of merit is the third performance measure that male leaders consistently raised as important to understanding the Swedish innovation system. Male leaders were more likely than female leaders to agree with the idea that an innovation will be recognized regardless of the gender identity of the innovation’s founder. The most significant variation in the sample of male leaders was between the government official and leaders in academia and the private sector. The male government representative was more attuned to the structural factors influencing gendered performance measurement in Swedish innovation systems, including the need for constant commitment and renewal in the process of creating a gender-neutral society.

Swedish women in academia and government demonstrated a nuanced understating of the systemic features inherent in gendered performance measurement within the national innovation system. Academic women in Sweden focused on the connection between numeric underrepresentation in innovation spaces and the masculine perimeters that define innovation spaces in Sweden. Innovations that deviate from heterosexual, white male culture are implicitly if not explicitly incompatible with

innovation norms in many cases. A female academic who worked in regional triple helix projects involving government, academic, and industry partners described the challenge in this system this way, “At the top of the management level there is no resistance on gender issues and they see the link with profitability and they see the justice argument, they want to be democratic. It is part of being sustainable and productive organization, they can see the links. But when you get down in the organization the awareness of these links is decreasing”-*Academic Sweden*. Another perspective that was raised is the challenge that leaders face deviating from dominant norms, “Even if they are open minded on the planning level and bring in the creative sector, service sector, health care sector, or other sectors that are gender balanced there are still challenges. For example, when they bring in the creative sector it is often the gaming industry which is highly masculine dominated so it becomes a vicious loop. There is still a male norm that they are operating from and they do not look at other parts of the creative industries that could be equally profitable”-*Swedish Academic*. Five key arguments for reimagining performance measurement in innovation spaces emerged in interviews with Swedish women. The arguments range from gender equality as a matter of social justice, to creativity, innovation, employee engagement and profitability. Women also addressed the concept of risk as a limitation of the current boundaries that define innovation systems; women in the private sector were more likely to discuss themselves and other women as being risk-aware rather than risk-averse in the Swedish case.

In the interview sample, Canadian across all categories government, academia, and the private sector were the most likely to be unaware that women are underrepresented in innovation spaces, with 86% of men interviewed confident that women have equal access to innovation spaces. In follow up questions Canadian men asserted that if there is a lower percentage of women in innovation spaces in Canada it may be attributed to women's lack of interest in the core technological aspects of innovation. Statements such as, "I don't see any barriers, if anything I see opportunity. The challenge is getting women interested in innovation" -*Canadian CEO* and "Naturally there are more men in the core technological aspects of the organization and the marketing, sales side is gender balanced, this just appears to be the natural distribution, perhaps the core technology does not appeal as much to women"- *Canadian Executive Director*. These statements reflect the shared perception that personal choice rather than systemic factors account for gender inequality in innovation. This sample group, frequently compared the lack of women innovation, to historic trends in other aspects of the Canadian labour market. As an example, historically low numbers of women entering medicine, law, and trades are now growing. Following these historical trends Canadian men favoured incremental change rather than measures such as quotas to achieve gender parity. The greatest variation within the sample was the difference in perspective between academic men and those in the public and private sectors. Academic men were more conscious of the gender blindness in Canada's innovation system and the absence of

research measuring the impact of gender inequality on the performance of Canada's innovation system.

Canadian women were more likely than Canadian men, but less likely than Swedish women, to raise the systemic factors that influence women's equal participation in national innovation systems. With the sample equally distributed, 50% of women agreed that gender is a factor in performance measurement and 50% did not see gender inequality as an issue in their work. Canadian women were not strongly in favour of quota measures to increase women's representation in innovation spaces; however, they were more likely to question whether the current system supports the most innovative and nimble minds within the country, or simply those that know how to navigate the current innovation structures. In one example, it was suggested that communication patterns often contribute to differences in access to opportunity, "Women do not necessarily use the language of innovation. Their work is not less innovative than men, it is just they don't tend to use that language or say their work is cutting edge. Words like innovative and radical help women to access different levels of funding and speaking opportunities" - *Canadian Researcher*. The strongest variation within the sample is between younger and older women, with more senior women reporting that gender is no longer a factor in women's performance measurement in innovation work. Younger women were more likely to report experiences of direct and indirect discrimination that impacted their performance. Older women were more likely to make historic comparisons which

illuminate the progress that has been made in workplace culture for women in recent history in Canada.

The subtle nature of stereotypes emerged more frequently in the Swedish interview dataset. Two examples illustrate the subtle impact of perception on performance. The leader of an organization working with new immigrants and innovation in Sweden observed that in her work, when people discuss young men at the beginning of their careers they describe the employee as a “promising young man.” When they describe a woman of similar age and relevant working experience, they are much more likely to refer to her as “young and inexperienced.” The implications of this subtle distinction are significant. The performance measure of promise is often enough justification to warrant additional resources, access to social networks and other forms of support. When a young man is identified as having promise, this is a powerful label that creates an expansion of opportunities; conversely, when a young woman is labeled as inexperienced, opportunities contract. The implication is that she should gain experience before she is given access to the same level of social and institutional support that is available to the young man.

In another Swedish example, leaders in engineering and the auto industry separately observed that promotional materials for innovation programs in Sweden often only include white men. Advertising images such as posters feature male hands or men in suits; this creates the perception that men are somehow more welcome in innovation spaces. The implication is that stereotypically male physical features or ways of

presenting oneself are ideal types for work in these sectors, which may discourage participation from women, the LGBTQ community and racialized groups. Advertising reveals bias and makes explicit false perceptions that white, heterosexual men are more capable of innovation than other people. Dislodging this performance measure is one of the most significant challenges in the Swedish innovation system because it is so deeply engrained (Stefansdottir & Gislason, 2010).

Equality, fairness, and meritocracy are values which underpin Canadian identity and thus influence how leaders think and talk about stereotypes and biases in innovation work. This sentiment was best summarized by a Canadian researcher who said, “I would really like to live in a world where the smartest and most innovative people are at the table, not biased towards gender.” In the public and private sectors, male leaders in Canada agreed that if an innovative idea has merit it will be recognized regardless of the identity of the founder. This is consistent with liberal free-market ideology and the economic rationale that the most profitable companies are competitive in the marketplace, while those without a market fail. However, all of the women interviewed in the Canadian sample regardless of sector qualified their responses with statements such as: “I would like to believe the most innovative ideas are recognized, but I know [that] people who are not native English speakers or are Indigenous People, and especially women are disadvantaged in the current system.” Another woman states that “If you put different people around the table, the whole conversation is going to get better”- *Canadian Academic*. Challenging racism and stereotypes is critical to the concept of meritocracy.

In Sweden, female leaders were much more likely to identify systemic factors that intersect with stereotypes to define opportunity structures for innovators. These stereotypes are not only about people, but about what innovation is and how ideas fit into the Swedish innovation system. The key challenge presented in the Swedish case is that many of the ideas brought forward by women do not fit within existing institutional boundaries. Leaders in academia, social innovation, and the creative economy said that “the best ideas are supported in Sweden if that idea fits within the boundaries that exist, which may be harder for immigrants to Sweden and women,” that “women tend to found businesses that have no place in the innovation sector,” and finally that “ideas that do not fit within defined boundaries are at a disadvantage.” This contrasted with male leaders in the private sector in Sweden, who held views similar to their Canadian counterparts that the system in Sweden is functioning to advance the most innovative ideas. As the CEO of a Swedish incubator said, “We are looking at ideas and looking at value and how to turn the ideas into a product, so we do not care who is bringing the idea to us.” Men in both the Canadian and Swedish sample were more likely to perceive that the lack of women presenting ideas at incubators or entering into innovation streams out of university was due to a lack of interest in innovation work. Women were more likely to perceive that systemic structures account for the low levels of female representation in innovation spaces.

### **Gender Equality, Board Diversity, and Innovation**

There is a growing interest in the relationship between gender consciousness and the impact of diversity on the capacity to innovate. The relationship between corporate leadership and innovation featured prominently in the interview data gathered in 2013 for this study. This issue is important empirically and theoretically on a number of levels from national policy-making to decisions about leadership at the organizational level. In 2002, the Norwegian government announced a 40% quota for female members on corporate boards throughout the country (Machold et al., 2013). The policy came into effect in 2008 and has served as a focusing event for gender equality in business, particularly in the Nordic countries but also throughout the European Union. Several other countries including Belgium, Iceland, Italy, the Netherlands, and Spain have also implemented similar quota-based policies (Engelstad & Teigan, 2012). In 2013, the Swedish Government signalled the right to impose quotas by 2016 if boards do not voluntarily raise female participation rates from a national average of 28% to 40%. In 2014, the Canadian Corporate Governance Board began making changes to the country's "comply or explain" policies. Formal changes were made to the Ontario Securities Commission *Disclosure of Corporate Governance Practices*, which has become colloquially known as comply or explain in Canada. Sweden has had comply or explain legislation in place since 2007, requiring publicly listed companies to disclose the gender of board members and senior management in their annual reports. In 2010, Swedish companies were encouraged to consider gender balance when determining the size and

composition of the board and to strive for gender equality (Catalyst, 2014). In Canada, the regulations are voluntary; Manitoba, New Brunswick, Newfoundland and Labrador, Northwest Territories, Nova Scotia, Nunavut, Ontario, Quebec, and Saskatchewan have all signed on to implement the regulation. Notably, British Columbia, Alberta, Yukon, and Prince Edward Island are absent from the voluntary regulatory framework. British Columbia and Alberta, the largest provinces absent from the comply or explain regulation, are natural resource-based economies. Notably, oil and gas, forestry, and mining, valuable sectors of the economy in British Columbia and Alberta, have low levels of female representation on corporate boards. In 2006, the province of Quebec had already mandated gender parity on public boards, making Quebec a leader within Canada (Sweigart, 2012). Comply or explain does not require companies to meet any specific targets; rather, they must report on what actions they have taken to increase board diversity and on the results of their actions. In 2014, the Canadian Government suggested a target of 30% women on corporate boards by 2019 and an open-ended objective of gender parity (Good for Business, 2014).

Corporate boards are high-profile spaces, and the decisions made by board members have social and economic impact. Organizations such as Catalyst, McKinsey, Deloitte, and the Boston Consulting Group have made quantitative data on the percentage of women on corporate boards increasingly available to facilitate cross-national comparison over time (Machold et al., 2013). In Canada, a 2014 Ontario Securities Commission Report stated that while two thirds of Canadian companies have one woman

on their board, only 18.6% have at least three women (GMI, 2013). The Conference Board of Canada conducted a survey on behalf of the Canadian Board Diversity Council in 2014, contacting 3467 corporate board chairs and directors with a response rate of 10%. The findings that emerged from the study highlight a chasm between what leaders believe to be true and the current state of diversity in corporate spaces: “Despite evidence that FP500 directors are largely homogenous when it comes to age, ethnicity and gender, 78% of board member respondents said they felt their board was diverse, the highest reported level since we started asking this question in 2010” (p. 10). Overall, leaders in Canada think that their organizations are more diverse than they actually are. The lack of required reporting on diversity encourages unrealistic perceptions of success. In the same study, 62% of board members and directors surveyed supported requirements for companies to make public reports on progress towards gender diversity, while 34% felt no change was needed, and only 4% supported quotas for the number of women on corporate boards (Canadian Board Diversity Council, 2014, p. 8). In 2014, women accounted for 17.1% of directors on corporate boards of FP500 companies. The overall total of 17.1% represents a significant variation across sectors. On the low end of the spectrum, women account for 5.7% of board directors in the waste management sector, and on the high end of the spectrum, women account for 27.4% of board directors in arts, entertainment, and recreation. Mining, oil and gas have 9.7%, health care and social assistance 15.8%, and finance and insurance 24% female representation (Canadian Board Diversity Council, 2014, p. 6). In 2014, only 4.5% of board chairs in Sweden were women (Catalyst, 2013).

Women's underrepresentation in leadership positions is important to innovation because evidence suggests that there is a correlation between diversity and increased innovation at the level of the firm (Parrotta et al., 2014; Torchia, 2013; Torchia et al., 2011). A Danish study used a comprehensive employer-employee database to match employee demographic data on age, gender, education and cultural backgrounds with firms' patent applications (Parrotta et al., 2014). The results of the Parrotta et al., study focus on diverse life experiences and creativity within organizations: "ethnically diverse workers tend to have a wider pool of different experiences, knowledge bases, and heuristics" (Parrotta et al., 2014, p. 306). These differential experiences contribute to creative problem-solving and a higher propensity for more diverse firms to file patent applications. The research determined that a 10% change in ethnic diversity increases firms' patent applications by approximately 2.2% (Parrotta et al., 2014 p. 345). In addition to increasing the quantity of patents, the research also demonstrates that ethnic diversity contributes to the breadth of patents a company applies for (Parrotta et al., 2014).

There is a growing body of literature on the impact of women's representation on corporate boards and the implications for innovation at the firm level (Catalyst, 2013). A number of studies have established a correlation between ethnic and gender diversity in organizations and increased innovation output (Catalyst, 2013). In a study that focused on a sample of Fortune 500 corporate boards, researchers found that innovation was positively and significantly correlated with board racial diversity, and marginally significantly correlated with board gender diversity (Catalyst, 2013). Research points to

four key variables of interest. Each of the four variables—varied life experiences, cross-cultural understanding, collective intelligence, and minority/majority group dynamics—shows positive correlation with innovation (Catalyst, 2013). Experimental research demonstrates that a collective intelligence factor emerges in groups of two to five people (Woolley et al., 2010). The intelligence of the group is not dependent on the maximum individual intelligence of each group member, but rather on the social sensitivity of group members and the ability to take turns in the conversation. Woolley et al., (2010) found that women in groups demonstrated a higher level of social sensitivity. This sensitivity contributed to more turns being taken in group conversation and a more intelligent group dynamic. In practice, corporate boards with higher levels of collective intelligence are more capable of generating organizational innovation (Woolley et al., 2010).

Research on varied life experiences in decision-making demonstrates that gender diversity on corporate boards is correlated with a greater commitment to corporate social responsibility. Diverse life experiences contribute to a company's positive reputation as well as CSR rating (Bear, Rahman, & Post, 2010). Varied life experience also contributes to the professionalization of both men and women on boards. Women on boards are twice as likely as their male counterparts to hold a PhD or to have notable achievements within the community (Bear, Rahman, & Post, 2010). Men are more likely to have experience on large corporate boards, while women are more likely to have experience on smaller boards (Bear, Rahman, & Post, 2010). Higher levels of education among women and

visible minority members on boards contribute to more responsible business practices, increased profitability, and improved stability (Machold et al., 2013).

In a sample of Fortune 500 companies, Miller and Triana (2009) found that the ideas, social networks, and higher education levels of visible minority and female board members stimulated innovation and enhanced corporate reputation. Visible minority and female board members contributed to companies' reputations through community engagement. In addition, diverse social networks bring new information about customers' needs into the organization. Diversity may also change the way that companies reflect their corporate image to customers, sending different signals to the public about openness and receptivity to customer feedback. These studies are important because they consistently show that varying life experiences and world-views enhance the capacity to innovate at the organizational level.

### **Data Collection and Performance Measurement**

Gathering data that records women's participation in innovation systems is important to counter the perception that women are less capable of innovation than men. From a global perspective, Canada and Sweden have excellent statistics agencies with high levels of administrative capacity; however, there are still gaps in the collection of gender-segregated statistics on innovation in both cases. In Canada, the cancellation of the long-form census has exacerbated the already limited supply of gender-conscious data available. In a report made to the Standing Committee on the Status of Women in 2011, expert witness Françoise Naudillon told a parliamentary committee, "Women in particular

would have everything to lose if the mandatory long-form census, as conducted until 2006, was cancelled” (Fry, 2011, p. 7). Although Sweden does not have a long-form census, other mechanisms used for mandatory data collection provide an equivalent level of reliability and validity to the long-form census data in Canada (Dillon, 2010). Access to reliable data allows government and researchers to continue to build a more accurate picture of where and how women are employed in innovation work. Data collection at the local and regional level, through academic institutions, funding agencies, and non-governmental organizations, has implications for national policy decision-making as well as cross-national comparison. The Swedish innovation agency Vinnova and the Swedish regional economic development agency Tillväxtverket collect gender-specific data on applications for grants administered by these organizations. The data collection process serves two purposes: firstly to gather information about the investigators receiving money from agency grants, and secondly to draw attention the gender balance of teams. In some instances, gender-balanced teams are given preference in the funding process over all-male teams. A similar process is not in place in the Canadian case.

In addition to gathering gender-segregated data at the institutional, regional and national levels, it is important to understand the top-down processes that characterize how performance is measured within national innovation systems. OECD performance measurement mechanisms define which countries are recognized as being innovation leaders or, conversely, laggards (Bloch, 2007). In independent rankings, OCED countries

including Switzerland, the United Kingdom, Sweden, the Netherlands, and the United States are frequently ranked in the top five most innovative countries in the world (Dutta, Lanvin, & Wunsch-Vincent, 2015). Canada is ranked outside of the top 10, at number 16, behind New Zealand and ahead of Australia (Dutta, Lanvin, & Wunsch-Vincent, 2015). The OECD's Oslo Manual is a guidebook for evaluating innovation within member countries and has set standards for how to define innovation since the early 1990s: "The minimum requirement for an innovation is that the product, process, marketing method, or organizational method must be *new (or significantly improved)* to the firm" (2005, p. 46). The Oslo Manual is influential in the world of innovation precisely because innovation can be ambiguous. Lasting innovation systems are not built around specific innovations, they are designed to stimulate activities that contribute to an environment where innovation flourishes. The Oslo Manual defines innovation activities broadly and differentiates between those activities that are innovative and those that support innovation. The first part of the definition focuses on those activities that are inherently innovative: "Innovation activities are all scientific, technological, organizational, financial and commercial steps which actually, or are intended to, lead to the implementation of innovations" (Oslo Manual, 2005, p. 47). The second part of the Oslo manual definition focuses on the activities that support innovation: "Some innovation activities are themselves innovative, others are not novel activities but are necessary for the implementation of innovations. Innovation activities also include R&D that is not directly related to the development of a specific innovation" (Oslo Manual, 2005, p. 47). This

very broad definition leaves considerable room for governments to support innovation activities in different ways. The choices made through national innovation systems regarding which activities to support are vital to determining the climate of innovation throughout the country. The third edition of the Oslo Manual, written in 2005, is the most progressive and inclusive set of innovation guidelines produced by the OECD. This edition aims to be more inclusive of diversity in the conceptualization and measurement of innovation than previous editions. The Oslo Manual third edition defines innovation in four categories: product innovation, process innovation, marketing innovation, and organizational innovation. The addition of marketing and organizational innovation encompasses much larger sections of the economy than were represented in the second edition. This expansion is reflective of national systems of innovation research and is designed to help OECD member states take a more holistic approach to innovation in the economy (Lundvall, 2010).

The Oslo Manual has shaped the discourse on innovation performance measurement in OECD member states. However, the Oslo Manual is not equipped to capture the relevance and contribution of gender equality within the innovation process: “Despite mentioning the importance of measuring communication patterns and organizational dynamics, the Oslo Manual does not recognize the structural and social characteristics that affect gender and involvement in innovation and does not provide instruction on how to capture these dynamics” (Crowden, 2003, p. 37). The guidelines

and measurement tools provided in the Oslo Manual are strongly oriented towards industries where women are less likely to be employed than men. Women are more likely to work in marketing and organizational change than in purely product- and process-related jobs.

### **Performance Measurement Recommendations**

In practical terms, performance measures influence where individuals, organizations, leaders, and countries focus resources within national innovation systems. If gender equality does not factor prominently in data collection and measurement of innovation performance, it will remain a tangential issue, never fully integrated into innovation policy programs. Thus it is important for Canada to learn from the Swedish example by adding reporting requirements in government-supported innovation spaces to gather gender-conscious data at the local and regional levels. With this data, it will be more feasible to create a national map depicting how women work in innovation spaces, and to what degree public resources for innovation are accessible to women, indigenous people, racialized groups, and people who identify as part of the LGBTQ community. The data on women and diversity on corporate boards serves as an example of how numeric evidence of exclusion sparks debate and creates the context for social change. However, gendered data collection risks replicating disparities that already exist in public administration (Stivers, 2002). By continuing the masculine tradition of privileging innovation activities that boost GDP and economic growth over other types of innovation, including social or domestic innovation, performance measurement may contribute more

to maintaining the status quo than to transformative change (Stivers, 2002). However, without attempting to understand more fully the presence and absence of women in innovation spaces, it is difficult to move past numeric representation and deal in a more thorough sense with women's substantive representation in innovation work.

One of the challenges that emerges in performance measurement is defining the concept of substantive representation for women in innovation spaces. In the political science literature, scholars have dealt extensively with the idea of critical mass and rejected the notion that an arbitrary figure (such as 30% women in an elected legislature) will result in more robust substantive representation for women (Caul Kittilson, 2006; Childs & Krook, 2006, 2008). Political scientists have critiqued women's ability to act for and represent women in political spaces. In some instances progressive men have contributed more to advancing feminist policy agendas than women in electoral politics. This debate is missing from the conversation on women and innovation (Torchia, 2013; Torchia et al., 2011). While there is evidence within the literature that suggests the presence of more women on boards has a positive impact on innovation, profitability, and corporate social responsibility, researchers have yet to establish a correlation between the presence of more women in innovation spaces and more innovations that support feminist goals. It is intuitive that this may be the case; however, there is a lack of data correlating women's representation in corporate leadership to social justice-driven innovation that benefits women's interests. This is not to say that women in innovation spaces need to

justify their existence in innovation spaces through a feminist lens, but rather that it is important to spark the conversation in innovation spaces about the pressure on women, and some men, to perform in ways that conform to masculine innovation norms.

## **Conclusion**

Performance measurement at all levels is a vital aspect of developing and building a body of evidence that facilitates the construction of innovation systems that maximize human talent and potential. Performance is measured in diverse ways, and the literature highlights the importance of looking at performance measurement from multiple perspectives and on different levels of interaction, from national policy objectives, to corporate leadership, communication patterns and visual symbols. Institutions have a significant role to play in providing leadership to move cultural and social norms forward by demanding that gender equality is considered and measured in innovation work.

Implementing gender-conscious data collection requires additional time, resources, and expertise, which is a challenge for practitioners working in the field. However, evidence-based decision-making is integral to the process of overcoming stereotypes about gendered performance in innovation spaces. Informal institutions “by their very nature... are hidden and embedded in everyday practices that are disguised as standard, and taken for granted” (Chappell & Waylen, 2013, p. 605). Thus making the implicit explicit breaks down artificial barriers that are not conducive to innovative thinking (Standal, 2013; Sweigart, 2012). Creating space for different ways of doing

business, and ways of thinking that run counter to established institutional norms, is the path to sustainable innovation systems.

## CHAPTER 6

### CHAPTER 6: Supporting Innovation: Resources and Gender Equality

#### Introduction

In Canada and Sweden, policy and performance measurement provides insight into how national governments conceptualize innovation within the context of the economy and society. However, the relationship among policy, performance measurement and innovation is fundamentally related to the distribution of resources within national innovation systems. Resource allocation is the bridge between the theory and practice of gender equality in innovation spaces. The way that financial support and other types of resources are allocated has a significant impact on opportunity structures for current and future innovators. These resources include public goods and services such as healthcare and education as well as fair and transparent tax and justice systems which create a positive environment to learn and engage in innovation activities (GII, 2015). Access to employment, social networks, and mentorship opportunities are also significant resources within innovation ecosystems. Innovation literature does not adequately explain how the disparity in resources available to women, indigenous peoples, LGBTQ communities, and racialized groups impacts the legitimacy and inclusivity of national innovation systems. Theoretically, feminist institutionalism (FI) draws attention to the “asymmetry of institutional power relations” that frame the distribution of resources in societies broadly (Kenny, 2007, p. 96). Chappell and Waylen (2013) assert that FI “makes us look at *how*

and *what* resources are distributed and *who* gets to do the distributing” (p. 602). In the context of innovation, this draws attention to both public and private resources as well as to national, regional, and local points of distribution. The following chapter frames the macro level distribution of innovation resources in Canada and Sweden through a comparative discussion of R&D spending across OECD countries. The second section of the chapter discusses the differences in public distribution of innovation resources in Canada and Sweden. The third section focuses on the gendered dimensions of access to private capital to facilitate the development of innovative firms. The fourth section looks beyond monetary resource distribution and considers the role of social networks and mentorship opportunities as gendered resources in national innovation systems. The chapter concludes with recommendations on resource allocation in national innovation systems in Canada and Sweden. The original contribution to knowledge made in this chapter is a comparative understanding of the power distribution of innovation resources in relationship to gender in Canada and Sweden (Chappell & Waylen, 2013).

Theoretically, this chapter contributes to the body of knowledge on the constitutive representation of gender (CRG) in political institutions through the application of CRG to innovation spaces in Canada and Sweden (Lindberg, 2012; Squires, 2008).

### **R&D Spending and Innovation in the OECD**

The magnitude of financial resources allocated to innovation is frequently captured by a comparative analysis of research and development spending (R&D) across OECD member states. R&D funding as a measure is often used informally as a proxy for

innovation. However, R&D funding is not an adequate measure to quantify the gender dimension of innovation spending when there is a misalignment between the locations where R&D funding is spent and the ways women are employed. The theoretical construct of R&D funding is consistent with masculine institutional norms present in the broader political and economic systems in Canada and Sweden: “Political systems have been constructed upon the exclusion or enforced absences of women and the feminine, while ‘[t]hat associated with males has received a disproportionate share of the resources and deemed more valuable than that which is associated with females’” (Duerst-Lahti, 2008, p. 182). Such is the case with the value placed on R&D funding in innovation spaces; the disproportionate importance placed on the masculine is relevant “regardless of the nature of the political regime or culture” (Chappell & Waylen, 2013, p. 602).

Explaining how R&D funds are allocated differently in Canada and Sweden provides insight into the gender dimension of innovation funding at the national level.

In the OECD, there is a spectrum of investment on R&D ranging from over 4% of GDP by the largest investors to less than 0.4% by the lowest investors. R&D investment tends to be higher in countries with fewer natural resources, and there is a global trend towards increasing R&D spending in lower-income countries to support economic growth and research-based employment (UNESCO, 2015). A recent UNESCO report suggests increased R&D investment is a building block for sustainable development as well as initiatives to address global health and environmental challenges (UNESCO, 2015). Israel invests the largest percentage of GDP in R&D in the OECD at 4.2%, followed closely by

Korea at 4.1%. Other top spenders in the OECD include Japan at 3.4%, Sweden at 3.3%, Finland at 3.3% and Denmark at 3%. The United States allocates 2.8% of GDP to R&D, while Canada and the UK allocate 1.6% of GDP to R&D. Canada and the UK are below the OECD average of 2.37% of GDP, and 1.93% in the European Union (OECD, 2015; 2016). In recent years R&D spending in Canada has declined, in contrast to the global trend of increased spending (Dufour, 2015; Statistics Canada, 2015). R&D spending declined between 2001 and 2013 in Canada due to a reduction in investment by the private sector (Dufour, 2015). Government investment has only begun to increase slightly in 2015<sup>1</sup> over the previous year (Statistics Canada, 2015). The lack of R&D spending in the Canadian case has contributed to Canada's decline in global innovation rankings and contributes to the lack of diversity within the Canadian economy (UNESCO, 2015).

Approaches to spending R&D funding are significantly different in Canada and Sweden, each with their own benefits and limitations. A gender perspective highlights that there are fewer R&D resources available to women in all countries because of the occupational hierarchies that influence access to R&D funding (Huyer, 2015). Sweden provides more direct support for innovation through research grants and programs to distribute innovation funds to universities, rather than tax incentives to the private sector (OECD, 2012). Direct spending favours the growth of younger firms that do not have the initial capital to invest in R&D early in the business cycle, which is advantageous for supporting businesses led by women and youth. However, R&D spending is heavily concentrated in the university sector in Sweden; this sector is subject to occupational

hierarchies which prevent women from holding the types of research positions that have access to R&D investment. Globally, women hold only 28% of the world's research positions. Sweden is slightly above average with women holding 37% of the country's research positions, while similar data is not available for Canada (UNESCO, 2015). In Sweden, the system of allocating funding promotes triple helix relationships that include government funding agencies, university researchers, and private sector partners working closely together on innovation projects (OECD, 2012). The lack of women in research positions contributes to the disparity in access to R&D funding. Parity of researchers has only been achieved in 1 in 5 countries, which are primarily countries in the former Soviet Union (Huyer, 2015).

The Canadian system is more diffuse and includes a larger proportion of tax incentives targeted at the private sector, which favours larger, more established firms (Niosi, et al., 2000). In Canada, Gross Domestic Expenditure on Research and Development (GERD), includes spending by business enterprises, private non-profit, the higher education sector, federal, and provincial governments as well as provincial research organizations (Statistics Canada, 2015). Like Sweden there are many projects in Canada that qualify as triple helix and involve partnerships between university research, government, and the private sector. However there are important differences in the proportion and alignment of public and private investment in R&D spending across cases. In Sweden private sector spending on R&D is 2.28% of GDP while in Canada business expenditure on R&D is only 0.83% of GDP (UNESCO, 2015). In addition, R&D

spending is correlated with the overall performance of the Swedish economy in global innovation rankings (UNESCO, 2015). However, in the Canadian case the sectors of the economy that are considered financial strengths including the financial sector, retail, oil & gas, and construction are not R&D intensive (UNESCO, 2015). R&D spending in both Canada and Sweden is aligned with male dominated sectors of the economy (Lindberg, 2012; Nählinder & Tillmar & Wigren, 2015; Salazar & Holbrook, 2007). This concentration of investment is detrimental to product, service and marketing innovation as well as social inclusion in national innovation systems. Women are overrepresented in service sector employment in Canada and Sweden and more likely to innovate in settings such as healthcare and nursing without the assistance of R&D funding (Nählinder, Tillmar, & Wigren, 2015; Salazar & Holbrook, 2007). The relative absence of female researchers with access to R&D funding in traditionally funded sectors combined with the absence of R&D funding in female dominated sectors means that institutions must adjust to fully support gender equality in innovation. The following sections move beyond R&D to explore other ways in which the public and private sector support gender equality in national innovation systems.

### **Public Sector Support for Innovation in Canada and Sweden**

Research and development spending is just one way that national governments support innovation. There are other ways that governments also support opportunities for innovation by individuals and organizations, through education and regulatory

frameworks. Drawing on data from the Global Innovation Index (GII) and the OECD's Program for International Student Assessment (PISA) this section focuses on the different competencies of the public sector in Canada and Sweden to distribute innovation resources. Comparing statistics across occupational categories highlights the unequal distribution of resource in male and female dominated sectors of the economy in both countries.

The World Intellectual Property Organization has developed the Global Innovation Index (GII) a rankings system which allows for cross-national comparison of a diverse range of resources that contribute to innovation. This index evaluates the stability of government institutions, investment in human capital as well as infrastructure, business sophistication, knowledge and technology outputs, market sophistication, and creative outputs (GII, 2015). Switzerland, the United Kingdom and Sweden occupy the top three spots on the GII because of their strength across each of the categories. In 2015, Canada fell to 16th place from 12th in 2014 out of 141 countries ranked in the index. The weaknesses in the Canadian system are primarily due to lower levels of investment in education, and productivity. However, within the detailed indicators used in the ranking system there are important differences in how the Canadian and Swedish governments support innovation. Education spending is a relative strength of the Swedish education system. Sweden spends 6.8% of GDP on primary and secondary school, the 15th highest in the world, compared to Canada which spends only 5.3% of GDP, 45th in the world (GII, 2015). However, high levels of education spending are no longer producing

internationally competitive test scores for Swedish students. Despite lower levels of funding Canadian students out perform Swedish students on the OECD's PISA exams for reading, math, and science. Canadian students rank 8th in the world while Swedish students are 34th. Chinese students have the highest PISA scores world wide (GII, 2015). Acknowledging that PISA scores are contextual and recognizing the limitations of standardized testing a comparison of PISA scores between Canada and Sweden provides some interesting insights. PISA scores provide a snapshot of early learning patterns that influence the readiness of girls and boys from different socioeconomic backgrounds to participate in innovation careers later in life. In Sweden, girls outperform boys on all measures in science, math, and literacy, however overall Swedish test scores are below the OECD average (PISA, 2012). In Canada, girls outperform boys on measures of literacy while boys outperform girls on science and math indicators (PISA, 2012). At the post-secondary level Canadian universities outperform Swedish universities in the QS university rankings Canada is 4th and Sweden is 13th in the world. The strength of the education system is a fundamental building block for gender equality in innovation. Both girls and boys having equal access to primary and secondary education in Canada and Sweden promotes equality and helps to address early barriers that prevent labour force participation and inclusion in innovation related work, later in adult life.

Government institutions also shape the relative risk for innovators of starting an entrepreneurial venture. Regulatory frameworks are an intangible support that influences the ease of hiring staff, paying taxes, and managing failures such as insolvency. Canada

ranks first in the GII on the overall business environment, while Sweden is 17th. Canada's relative strength is due to the ease of starting a business, paying taxes, and resolving insolvency, Sweden ranks significantly behind Canada on all three measures (GII, 2015). Systems for entrepreneurs to establish businesses with relative ease and minimal expense are strategic advantages in the global innovation market. In the interview data gathered for this study leaders in Sweden were more likely than Canadian leaders to raise the cost of hiring and firing staff as a barrier to growing innovative firms. The findings of the GII support the difference in cost associated with redundancy in both countries. The cost of redundancy and dismissal is equivalent to 10 weeks of salary in Canada and 14 weeks of salary in Sweden (GII, 2015). The cost of acquiring staff and risk of expenditure related to redundancy has gendered implications. Given the costs associated with staffing, managers may be more likely to hire people that they know, which may create employment networks that exclude women and racialized groups. Costs associated with hiring and redundancy also increase the risk of growing a business which is significant for smaller firms, led by new immigrants and women.

Many industries that disproportionately employ men (including the auto industry, oil and gas, forestry, and steel production) have institutional support through state backed financing in a variety of forms. This support may include tax incentives, R&D grants, and financial bailouts in times of economic crisis (Lindberg, 2010, 2012). The discrepancies in state support for male-and female-dominated industries is supported by research in Sweden that shows that men and masculine sectors are much more likely to get access to

public funds for innovation projects (Lindberg, 2008, 2010). An analysis of gendered innovation spending in Sweden demonstrated that women were more likely to receive micro-credit loans. However this was the only initiative which favoured women, all other funding programs studied in Sweden prioritized men (Lindberg, 2008, 2010). Research in Sweden indicates that 80 percent of innovation funds are allocated to male dominated industries (Lindberg, 2010). A similar gender conscious innovation budget analysis has not been conducted in Canada (Bakker, 2009). However a brief analysis of the Canadian case highlights similar trends. In 2014, the featured innovation spending announcements in the federal economic action plan are consistent with the Swedish findings. Outside of university spending, \$500 million was allocated over two years to the Automotive Innovation Fund and \$40 million to the Canada Accelerator and Incubator Program (Flaherty, 2014). Spending patterns in Canada are consistent with the linear model of innovation, allocating resources to industries that commercialize innovation rather than allocating resources to solve problems (Godin, 2006; Nählinder, Tillmar, & Wigren, 2015). Male-dominated industries also benefit from a high degree of social capital linking elites across university, government, and academic institutions. The connection between university and industry is measured in GII rankings, Sweden is 11th and Canada is 18th in university industry research collaborations (GII, 2015). While these university industry linkages are beneficial for innovation they pose challenges for gender equality. The concentration of resources in institutions that are gender biased perpetuate the exclusion of marginalized groups from accessing the necessary resources to innovate.

Gendered patterns of employment also influence how states distribute innovation resources. In Canada and Sweden, women are concentrated in sectors of the economy that do not correspond with traditional definitions of innovation. Sectors of the economy that are not defined by risk, technology, and economic profitability, are thus viewed as lacking innovation (Andersson et al., 2012). Statistics Sweden (2014), calculations of gainfully employed people by region and sector indicate that women are overrepresented in employment in county councils, public administration and service sector employment in comparison to men. Women account for 71% of employees at the county council level which includes a variety of occupations including nurses, doctors, dental nurses, nursing assistants, building caretakers, and midwives (Statistics Sweden, 2015). The only county council occupation where men outnumber women, is in the category of specialist physician, where men hold 53% of positions (Statistics Sweden, 2015). In Sweden, women are more likely to be employed in the service sector, where women occupy 79% of public administration and service enterprise positions nationally. Women and men are almost equally represented in commercial and industrial sectors, however men represent 63% of those employed in the category of other organizations and public institutions (Statistics Sweden, 2014). In Canada, women occupy only 21% of positions in goods producing sectors, while they hold 55% of positions in the service producing sector, and 81% of positions in healthcare and social assistance (Statistics Canada, 2015). Public administration is more gender balanced in the Canadian case with men and women each having 50% employment in this sector (Statistics Canada, 2015). While these statistics

give a general sense of occupational segregation it is important to also consider the stratification of leadership positions within occupational categories, where women are less likely to hold leadership positions across all sectors of the economy (Catalyst, 2013, 2014). Similarly Canada and Sweden rely on restrictive definitions of innovation that are tech focused and masculine dominated to guide public spending within national innovation systems (Andersson et al., 2012; Lindberg, 2010; Nählinder, Tillmar, & Wigren, 2015). This similarity in focus is due to larger issues of power and gender hierarchy in society that are “embedded in the gendered constructions of innovation” (Alsos, Ljunggren, & Hytti, 2013, p. 247). These decisions limit the potential to develop an innovation culture within society that is inclusive of all people regardless of gender, sex, ethnicity, and social class (Alsos, Ljunggren, & Hytti, 2013). Current spending patterns in both countries do not adequately support innovations that improve quality of life by solving environmental, health, social, and economic challenges (Lindberg, 2012). To shift the focus on innovation spending beyond current priorities, it is necessary to challenge the relationship between innovation and economic growth (Andersson et al., 2012; Lombardo, Meier, & Verloo, 2009).

### **Private Capital and Innovation Funding in Canada and Sweden**

Public sector support for innovation is the foundation for equitable distribution of resources within national innovation systems. However, access to private capital is an equally important aspect of developing a vibrant and inclusive innovation ecosystem. The challenges that exist in the equitable distribution of resources in the public domain are

mirrored in the private sector. One of the contributions of feminism is to “erode boundaries of the political”; this section seeks to erode the boundaries between public-sector and private-sector support for innovation, illuminating the ways in which outdated concepts of gender guide both public and private support for innovation in practice (Squires, 2004, p.120 ). As Squires asserts, by exploring the links between institutions of government and wider social practices, we make it possible for them to be reconfigured more profoundly (Squires, 2004).

In Canada and Sweden, gender is an important variable that often determines access to private financing for entrepreneurial ventures. The OECD finds that “Women entrepreneurs rely substantially less than men on external loans, both for start-up and financing their activities” (OECD, 2012, p. 297). Practically, private capital not only assists innovators in the startup phase of a business venture, it is also critical to making investments in innovation in established firms (OECD, 2012). In Canada, women are more likely to report having difficulty accessing credit from banks than their male counterparts, and are often asked to provide more formal documentation to access bank loans than male entrepreneurs (OECD, 2012). In Canada and Sweden, overt discrimination is prohibited; however, unconscious gender bias is still prevalent in many professional spaces (Thébaud, 2015).

In Sweden, men are more likely than women to access private-sector funding to advance their business ventures (OECD, 2012). The combination of resources and skills required to innovate is constantly shifting as industries and technologies evolve.

Gendered life experiences and biological sex differences are variables that can open up new avenues of scientific inquiry, health and innovation (Richardson, 2008, 2013; Schiebinger & Schraudner, 2011). Yet communicating gender-specific innovation ideas to predominantly male audiences of investors is often a significant challenge for innovators (Kennedy, 2016). Outside of banks and credit unions, venture capital provides another avenue for innovators to access investment. However, the OECD estimates that over 80% of venture capital investors in Canada and over 70% of venture capital investors in Sweden are male (OECD, 2012, p. 313).

Experimental research in the United States has also found that when men and women make the same business pitch, men are perceived more favourably 60% of the time (Brooks et al., 2013). The degree to which women must become “honorary men” to be accepted and taken seriously as entrepreneurs is an ongoing debate in the literature (Ahl, 2006). In the entrepreneurship literature, Coleman and Robb (2012) contest the construct of women as “honorary men” in entrepreneurship spaces. Women may feel pressure to adhere to established norms, but they are increasingly redefining entrepreneurship on their own terms: “They have found ways to be successful by carving out their own path. Further, they have defined success on their own terms, not necessarily on Wall Street’s terms or in the terms of their male counterparts” (Coleman & Robb, 2012, p. 236). In interviews in Canada and Sweden, different approaches to risk emerged as a critical issue in explaining access to private capital for male- and female-led businesses. Leaders in Canada and Sweden are supportive of women as innovators, but

women were more likely to claim that the system sidesteps their innovations. When women are doing service innovations and the system is built to support technological innovations, there is a mismatch in expectations around scalability and growth. At the same time, when innovation is only measured in economic terms and the very definition of growth is defined in masculine terms, this limits the range of what is accepted in the system. Masculinity is expressed by a preference for bigger firms employing more people, rather than a number of smaller firms employing fewer people (Lindberg, 2012).

Yet these institutional preferences have not kept pace with changes in the Swedish economy; small business is now the fastest-growing segment of business in Sweden.

Simply stated, 100 small firms create as much employment as one large firm that employs 100 people. However, the growth of smaller, more measured business ventures is often in conflict with a culture of risk-taking and presumptions about the immediate need for scalability and geographic expansion. The assumptions which construct gendered life experience as binary, with males seeking high-risk and high-growth ventures and females seeking low-risk, small-growth ventures, fail to capture the complexity of innovators' aspirations.

### **Social Networks and Mentorship as Innovation Resources**

Globally, the absence of role models and mentors is recognized as one of the most significant barriers that prevent women and girls from engaging in innovation-related careers, regardless of prior levels of education and social class (Hafkin & Huyer, 2006).

However, to create innovation networks that are genuinely inclusive, it is important to

apply the concept of constitutive representation of gender (Squires, 2008). Constitutive representation is about “claims-making” and unravelling the connection between the articulation of women’s interests and mainstream policy agendas (Squires, 2008, p.188). In innovation spaces, there is a strong tendency toward the representation of women that conform to existing gender and class structures which are supported by corporate and government institutions. Programs offered by governments reflect the inclusion of women who conform to the interests of economic and policy elites (Franceschet, 2002; Matear, 1997; Waylen, 2000). The Swedish and Canadian governments have developed leadership and mentorship programs to bridge the gap in access to social networks for women in innovation spaces. The Swedish government has sponsored two significant programs to help women access social networks in entrepreneurship and, by extension, innovation. In 2008 Tillväxtverket, the Swedish Agency for Economic and Regional Growth, launched the Ambassadors program. Since its inception, the Ambassadors program has recruited over 800 women across the 21 regions in Sweden to serve as role models and mentors to women aspiring to a career in entrepreneurship. The regional diversity of women participating in the program is intended to make claims that rural women, and suburban women in remote regions of Sweden, can also be innovators (Squires, 2008). Women are recruited from all sectors of the economy to volunteer and give educational talks, or to meet with young women to encourage careers in small and medium sized enterprise. The goal of the program is to challenge the stereotype that entrepreneurship is for men only. The success of the program has inspired a European Ambassadors Program, launched in

2009 by the European Union. The formal objective of the program is to inspire young women to consider launching their own businesses. However, the Ambassadors program has also served to make the Swedish Regional Development Agency more aware of the needs of women in innovation. Many women come into contact with Tillväxtverket to volunteer as Ambassadors. As their work progresses, they continue to serve on government advisory boards and business development programs.

The program has had multiple benefits, including creating space for networking—knowledge-sharing that is top-down and grassroots in origin. From 2012-2014, Tillväxtverket launched another initiative called the Golden Rules of Leadership. The program was initially developed as part of the International Council on Women's Business Leadership in the United States, under the direction of the Secretary of State Hillary Clinton. The Golden Rules of Leadership was launched in Sweden to encourage prominent businesspeople to pay forward their success to the next generation of leaders in the country. The pledge at the centre of the program encouraged leaders to be proactive in including women in their professional networks. The pledge included three simple rules and specific corresponding actions:

Golden Rules of Leadership	
Share Your Network with Rising Women Leaders	Make it possible for more women to take on leadership positions as managers, experts, entrepreneurs, chairpersons and board members.
Actively Promote Women As Role Models	Emphasize the importance of women's leadership and entrepreneurship both in my daily work and through public platforms.
Endorse and Make Women more Visible	Create professional opportunities for rising future leaders by opening doors through mentorship and sponsorship, which in return will inspire next generations and pay it forward. <a href="http://goldenrules.se">http://goldenrules.se</a>

The Golden Rules of Leadership helped to make explicit the implicit bonds and connections that people in positions of privilege take for granted. In 2015, the Canadian Government launched a similar campaign to the Golden Rules of Leadership, with limited success, titled It Starts with One—Be Her Champion. The program also encouraged business leaders in Canada to mentor one woman under the age of 35 for one year, in their field of expertise. These formal initiatives developed by government to open up social networks to women serve as a template for further work within the field of innovation. The Swedish Ambassadors program highlights that when women take on leadership roles, they can break down stereotypes. Similar programs are also being offered in many corporate spaces in Canada and Sweden to attract and retain employees from diverse backgrounds.

## **Resource Allocation Recommendations**

Funding discrepancies have practical implications for the quality and quantity of innovation that economies are capable of producing. The OECD Gender Gap report found a patterns across 23 member states: businesses founded by women produce less innovative outcomes than those founded by men (OECD, 2012). The OECD attributes lower levels of product and process innovation in enterprises founded by women to a number of factors. The relevant variables include the sector in which the business is founded, start-up capital and size, as well as a woman's entrepreneurial experience prior to startup (OECD, 2012, p. 309). However, a growing body of research demonstrates that less innovative outcomes in female-led enterprises are directly correlated with reduced access to resources (Andersson et al., 2012; Head et al., 2013; Lindberg, 2010; Nählinder, Tillmar, & Wigren, 2015; Salome, Damilola, & Sunday, 2013). If the objective of innovation policy in Sweden is to create a more innovative society, this can only be achieved by making strategic investments that support a diverse set of ideas and actors (Sweden, 2012). In the Swedish case, it is clear that innovation funds must be distributed through a larger variety of sectors in the economy, including those that fail to conform to masculine innovation norms (Lindberg, 2012). In the Canadian case, more research is required to map the gendered implications of innovation spending patterns by sector. Critics of gender audits argue rightly that these exercises may be reductionist, and, for the sake of administrative efficiency, reduce legitimate political claims to male/female

binaries for statistical purposes (Kantola & Squires, 2012). However, it is important to consider that without accurate information on innovation spending patterns in Canada, it is difficult for women in R&D as well as grassroots organizations to make claims for access to mainstream innovation resources.

In practical terms, the leaders interviewed in both cases articulated in different ways that a lack of resources contributes to and or mitigates risks for innovators. In the Canadian case, access to SSHRC, NSERC, and CIHR grants are critical to innovation research that crosses boundaries between disciplines. However the risk of engaging in interdisciplinary research is amplified by existing institutional arrangements, “Funding for interdisciplinary research is limited and research is often passed back and forth between SSHRC and NSERC, hampering innovation” -*Canadian Academic*. Researchers that attempt to conduct interdisciplinary studies that bring in a gender component, are often inadvertently penalized, and risk being left behind in the grant process. In the Swedish case the relationship between risk and access to resources is also evident in private sector innovation incubators, “Women experience discrimination financing businesses when incubators portray work in a masculine way, it is not fair to put the burden on the women to change when it is more about the structure that is around them. You cannot put all of the responsibility on women to be louder, that is not fair, it is part of the gender system that is built up in this way. There is something wrong with the system that cannot perceive women entrepreneurs in the same way as men” - *Swedish Government Official*. Reframing risk is an important part of raising awareness about the

consequences of innovation failure, personally and in the larger sociopolitical context. Presently in Canada and Sweden, much of the risk of innovation rests on individual entrepreneurs and researchers. However, this is not inevitable; if innovation is an increasingly important part of the Swedish and Canadian economies, it is important to question how risk is allocated. In the Swedish case specifically, the cost of hiring and firing staff is prohibitive for the growth of many small business ventures. The burden of covering insurance costs and benefits is particularly high for new immigrants to Sweden and first-time entrepreneurs, who are often female. In order to make the Swedish innovation system more inclusive, the government should offer grants and direct support that assists entrepreneurs in risk-taking without diminishing workers' rights. Interestingly, childcare was raised by half of Swedish leaders, regardless of gender and sector, as a strategic advantage in the development of an innovation-based economy. Publicly funded childcare is an asset for both men and women. State support mitigates the costs associated with time spent away from children and allows workers more freedom to be self-employed. In the Canadian case, childcare is not associated with innovation in the national policy discourse. However, the lack of affordable and accessible childcare throughout most of the country (with the exception of Quebec) is a critical issue for gender equality in innovation work (Mahon, 1999). In Canadian interviews, over fifty percent of women mentioned the availability of childcare as factor in career planning, while no men in the Canadian case raised childcare issues in the process of deciding to engage in innovation. The difference in responses in the Canadian and Swedish cases

highlight that the responsibility for childcare disproportionately falls on women in Canada, in contrast the welfare state in Sweden. If women are to be full participants in innovation work, which often includes periods of travel and self-employment, there must be affordable and reliable childcare solutions available. The final recommendation is focused on the common challenge present in both cases. In Canada and Sweden, innovation spaces are rarely inclusive, and innovation resources are often concentrated in physical spaces such as innovation incubators. The Canadian and Swedish governments need to take proactive steps to ensure that funding for incubators is contingent on a diversity planning.

## **Conclusion**

Canada and Sweden have adopted different approaches to funding innovation at the national level. Sweden outspends Canada on R&D as well as investment in primary and secondary education (GII, 2015). However, from a gender perspective, the implications of different spending patterns are minimal. Occupational segregation, in combination with prevailing masculine innovation norms, strongly influences when and where innovation resources are spent in both countries (Andersson et al., 2012; Lindberg, 2012). To advance gender equality within national innovation systems in Canada and Sweden, it is necessary to adopt a broader definition of innovation, one which recognizes innovations developed outside of commercial settings. Allocating innovation resources within the service sector, healthcare, and public administration creates new avenues for gender-conscious innovation. At the same time, it is necessary to consider barriers that

contribute to occupational segregation, and break down barriers to women's participation in all aspects of innovation throughout the economy. The relationship between access to financial resources and social capital is intertwined in the gendered power dynamics of public and private institutions (Chappell & Waylen, 2013). Learning that takes place in innovation spaces builds trust and social capital, making explicit the informal rules of the game, but only to those who have access to innovation networks (Krook & Mackay, 2011). The Canadian and Swedish governments are taking steps to help women open doors to social networks through institutionalized mentorship programs. However, these programs are subject to the limitations of elite power interests, which often fail to include actors that do not conform to masculine innovation norms (Lindberg, 2012). In Sweden, there is little evidence to suggest that the innovation system is successfully incorporating new immigrants and providing the necessary financial support for newcomers to engage in innovation work. In the Canadian case, little attention has been paid to the inclusion of new immigrants, indigenous peoples, women, and LGBTQ people in the knowledge economy. Thus there is considerable opportunity to advance innovation through greater attention to equality of resource distribution in both Canada and Sweden.

## **CHAPTER 7**

### **CHAPTER 7: Conclusion Designing Equality of Opportunity**

#### **Summary**

In both Canada and Sweden, innovation policy is increasingly an area of political and economic interest. This comparative research provides an in-depth study of the different approaches to innovation policy, performance measurement, and resource allocation across cases. Sweden is substantively ahead of Canada in the development and implementation of a gender-conscious innovation agenda. However, the two countries share many of the same challenges and opportunities to alter the trajectory of national innovation systems in ways that facilitate gender equality, diversity, and innovation.

This study is interdisciplinary, as it draws upon a diverse selection of literature in political science, entrepreneurship, innovation, and gender studies, as well as science and technology research. The use of comparative statistical data from the OECD supports the qualitative interview data and document analysis throughout each of the chapters. The findings of the research indicate that a gender-conscious national innovation policy is the foundation for equality of opportunity within national innovation systems.

Complementary to policy, performance measurement requirements and public financing of innovation must be harmonized with policy objectives to achieve gender equality in practice.

### **Intersectionality and the Triple Helix**

The intersection of institutions—government, academic, and private sector—is instrumental to explaining the success of national innovation systems in Canada and Sweden, as well as the relative lack of gender equality across cases (Chapter 3). The triple helix model underscores how relationships, information, and resources flow in sequence to support the discovery, growth, and dissemination of innovation (Carayannis & Campbell, 2010; Etzkowitz & Leydesdorff, 1996, 2000; Etzkowitz & Zhou, 2006). This research aspires to make visible the invisible shadow of the triple helix model, where identity intersects with institutions, creating different experiences and opportunities for innovators who fall outside accepted innovation norms (Chappell & Waylen, 2013; Schiebinger, 2008; Squires, 2008).

In Sweden, there is a stronger connection between the public sector, private sector, and academia in innovation networks than in the Canadian case (GII, 2015). These collaborative relationships contribute to the innovativeness of the Swedish model. However, the established nature of innovation networks create additional challenges for the inclusion of new actors, such as immigrants and women, in innovation spaces (Andersson et al., 2012; Lindberg, 2012). The comparatively diffuse nature of innovation networks in Canada offers the potential for permeability by new actors, in ways that may be more difficult to achieve in Sweden.

### **Representation of Women as Innovators**

This study explains how political parties construct the substantive representation of women in innovation in Canada and Sweden through the presence and absence of policy programs (Chapter 4). At the time of this study, both the Canadian and Swedish governments were led by the centre-right parties, in their respective political contexts. The Conservative Party of Canada, led by Prime Minister Stephen Harper, is arguably more to the centre-right than the Swedish Moderate Party, led by Fredrik Reinfeldt, in comparative terms. As pro-business administrations, both governments favoured lower taxes and policies to support economic growth. However, the Swedish moderate party took a more proactive stance on innovation policy and the construction of women as innovators within the national policy framework (Swedish Innovation Strategy, 2012). In contrast, the Canadian Conservative Party advocated women's entrepreneurship and programs to support women in business, but made no credible policy effort to dislodge masculine innovation norms (Bird & Rowe, 2013).

This study collaborates in the constructive representation of gender in innovation spaces (Celis, Childs, & Kantola, 2014). Through the use of expert opinions gathered in interview data, this corroborates existing research that establishes the scientific and economic grounds for women's participation in national innovation systems (Chapter 4; Chapter 5; Chapter 6). At the same time, this research encourages people (women, men, indigenous peoples, members of the LGBTQ community and racial minorities) who may not identify as innovators to claim space in the innovation discourse.

### **OECD International Dimensions of Gender and Innovation**

National policy decisions are central to the findings in this study. Theoretically, feminist institutionalism draws attention to the difference in approaches to gender and innovation in Canada and Sweden (Chappell, 2002; Chappell & Waylen, 2013; Krook & Mackay, 2011; Mackay, Kenny, & Chappell, 2010; Orloff, 1993, 2009; Stivers, 2002). Comparative data, policy reports, and common indicators that originate from OECD research provide international context throughout the case study. Innovation indicators are an important aspect of cross-national comparison within the OECD, and thus this case study draws on available data where possible to explain differences between Sweden and Canada, as well as other countries within the OECD.

In each of the three data chapters on policy, performance measurement, and resource allocation, there is an international dimension that provides depth and context to the comparative case study (Chapter 4; Chapter 5; Chapter 6). National governments have an important role to play in the process of creating an environment where innovation can develop, and equally mitigating the negative effects of change (Archibugi & Filippetti, 2015; Lundvall, 2010). However, innovation is increasingly an international phenomenon, and the relationship between gender equality and innovation is not yet institutionalized in the work of the OECD.

### **Contribution to Knowledge**

This research contributes to the body of knowledge on gender equality and innovation policy. This is the first comparative case study of innovation policy,

performance measurement, and resources allocation from the perspective of gender equality to include Canada and Sweden (Andersson et al., 2012). The findings are novel, insofar as this work challenges the comparative superiority of the Nordic model for gender equality in innovation spaces (Squires, 2008). The findings highlight similarities in the challenges faced in both countries to create gender equality in innovation spaces, despite differences in economic assets and welfare state models (Esping-Andersen, 1990, 2002, 2009; Korpi, 2010). As an exploratory case study, the empirical contribution is a snapshot of policy and practice at a specific time in the history of innovation policy-making in both countries (2012-2014). This research also contributes more widely to the existing body of innovation literature in Canada and Sweden respectively (Ahl, 2004; Andersson et al., 2012; Berglund & Granat-Thorslund, 2012; Lindberg, 2007, 2010, 2012; Lindberg & Lindgren, 2010; Lindberg, Danilda, & Torstensson, 2012; Lindberg & Udén, 2010; Petterson & Lindberg, 2013; Sundin, 2012; Sundin & Holmquist, 2013). This study offers a comprehensive understanding of gender equality and innovation policy that has been absent from the Canadian innovation discourse (Crowden, 2003; Pouragheli & Beckton, 2013; Salazar & Holbrook 2003, 2007). In the Swedish case, this research offers a comparative perspective on innovation policy between Canada and Sweden, which is not present in the Swedish gender and innovation literature (Andersson et al., 2012). Theoretically, this study also contributes to the literature on the constructive representation of gender within the triple helix innovation model in Canada and Sweden (Etzkowitz & Leydesdorff, 1996; 2000; Squires, 2008). Lastly, the findings highlight the

multiplicative effects of gender inequality at the intersection of institutions: university, government, and private sector. This study finds that dominant institutional hierarchies result in the exclusion of women, LGBTQ people, indigenous peoples, and new immigrants from mainstream innovation practices in both Canada and Sweden.

### **Limitations of the Research**

This study is designed to explain the difference in approaches to gender equality and innovation policy, performance measurement, and resources allocation in Canada and Sweden in the period from 2012-2014. The limitations of the research arise from the specific nature of the case study methods, which include qualitative document analysis and semi-structured interviews. Interviewing leaders within their universities, companies, and organizations created a success bias in the sample. Each of the people contacted to sit for an interview was chosen primarily on their professional title and their ability to speak from a place of knowledge about innovation in their country and or industry. Thus personal demographic information was not gathered, although some informants self-identified through the information they shared as women, immigrants, members of the LGBTQ community, and ethnic minorities. This personal information was not gathered in a systematic way. The findings of this study are specific to the particular time period (2012-2014), the documents reviewed, and the sample interviewed in Canada and Sweden, and thus not generalizable beyond the boundaries of this case. However, this research may inspire similar in-depth analysis that extends the comparative understanding of gender equality and innovation. In addition, this study provides a foundation for future

comparisons between Canada and other Nordic countries such as Norway, Finland, and Denmark. The findings also establish the framework for considering the gendered implications of federalism in national innovation systems, which may be useful for future comparisons between Canada and Australia.

### **Opportunities for Further Research**

There are a number of specific areas for future research that arise from this case study, and that may contribute to the body of knowledge on gender equality and innovation in Canada, Sweden, and the OECD (Alsos, Ljunggren, & Hytti, 2013). The Canadian and Swedish cases point to an emerging relationship between the scarcity of natural resources and the inclusion of women in predominantly male innovation spaces (Blake & Hanson, 2005; Forsberg, Pettersson, & Lindgren, 2012; Lundqvist & Westberg, 2012). In locations where natural resources are scarce, women appear to experience a higher degree of inclusion than in places where natural resources are abundant. Further research is needed to tease out the causal factors in this relationship. This may provide insight into historical patterns and explain why some innovation spaces are more open to new sets of actors than others. Interprovincial comparison in Canada may point to different relationships between the prosperity of resource-based economies and gendered approaches to innovation policy-making and practice (Godin, 2006).

There is a shortage of data on gendered innovation spending in Canada, both at the provincial and federal levels. Conducting a rigorous gender audit of innovation spending

in Canada is an empirical contribution that would add a depth of knowledge to the Canadian case.

In an interdisciplinary review of gender and innovation literature that includes the fields of innovation, entrepreneurship, management, science, engineering, and healthcare, the authors call for greater research on the power dynamics of gender equality and innovation policy (Alsos, Ljunggren, & Hytti, 2013). This case study begins to address the substantive differences in constructive representation of women in innovation in Canada and Sweden (Celis, Childs, & Kantola, 2014; Squires, 2008). It would be possible to make a theoretical contribution to the discussion on the relationship between power and inclusion by extending the research used in this case study across all OECD countries. Explaining how different types of political parties on the spectrum (right, left, centre) represent women in innovation policy documents at the national level in contrast to the representation of women in labour market policy documents may contribute to the literature on gender, innovation and power (Alsos, Ljunggren, & Hytti, 2013). Further case studies as well as quantitative discourse analysis may contribute to a systematic understanding the variables that influence gendered power dynamics in innovation spaces.

### **Implications for Policy and Practice**

The implications for policy and practice that emerge from this case study are divided into three categories: implementation of existing policy, drafting new policy, and challenging administrative silos. The Swedish Innovation Strategy (2012) calls for a more

progressive and inclusive vision of innovation within the country, one that recognizes service and social innovation as well as product and process innovation (Edquist, 2014). The policy also supports a diversity of actors in innovation spaces. However, this case study highlights that in the experience of leaders in the field, there is a gap between the government's formal policy intentions and everyday innovation practices. Thus to move the innovation strategy from a vision to common practice, attention must be dedicated to diversifying resource allocation to adequately support an inclusive innovation agenda (Andersson et al., 2012). This may be done by adding new resources to innovation budgets or by changing requirements for existing innovation grant programs.

In the Canadian case, if and when the federal government begins to work with provinces to develop a national innovation strategy, there is considerable opportunity to learn from the Swedish case and develop an inclusive policy framework from the outset. The development of a national innovation policy in Canada would require substantial commitment from each of the provinces, given the overlapping responsibility for innovation-related portfolios (Wolfe & Bradford, 2013). There are significant advantages to a coordinated national policy framework from a gender perspective. Establishing performance measurement and funding programs that flow from a common commitment to inclusive innovation minimizes the need to duplicate efforts within each province and territory. At the same time, a clear policy directive sends a message to innovators that a diverse range of actors ideas will receive institutional support within the country.

Finally, the third recommendation for policy and practice is common to Canada, Sweden, and the OECD. This study demonstrates that there is a depth of knowledge on gender equality and innovation that is not being utilized to full capacity due to administrative silos (Mahon & McBride, 2008; Woodward, 2009). Breaking down administrative silos may at times be tedious and demanding; however, the benefits in innovation have yet to be realized in Canada and Sweden. Innovation is interdisciplinary, and thus traditional institutional boundaries in universities, corporations, governments and international organizations are at odds with the types of complex thinking required to solve old problems in new ways. The next generation of innovation will likely flourish in places where institutional support is transparent and inclusive.

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## Appendix A: List of Interview Participants

Name	Title	Organization	Country	City	Sector
1.	Project Leader	The Creative Plot	Sweden	Lund	Public
2.Katrina Petterson	Professor	NORDREGIO	Sweden		Academic
3	Professor		Sweden		Academic
4	VD/CEO		Sweden	Gothenburg	Private
5.Tatiana Temm	VD/CEO	Ampersand&	Sweden	Gothenburg	Private
6.Kristina Theander	Founder/CEO	Middagsfrid	Sweden	Stockholm	Private
7.Alice Marshall	Gender Equality and Diversity Consultant	AddGender	Sweden	Stockholm	Private
8			Sweden	Stockholm	Private
9.Mårten Öbrink	VD/CEO	MINC	Sweden	Malmö	Public
10			Sweden	Lund	Academic
11.Per Garvell		LIFT	Sweden	Lund	Public
12.Susanna Bill	PhD Student	Lund University	Sweden	Lund	Academic
13.Gunilla Thorstensson	Program Director, Promotion of Women's Entrepreneurship	Tillväxtverket	Sweden	Stockholm	Government
14			Sweden	Stockholm	Government
15.Anna Seravalli	Researcher Design for Social Innovation	MEDEA Collaborative	Sweden	Malmö	Public Sector
16	CEO		Sweden	Lund	Private

<b>Name</b>	<b>Title</b>	<b>Organization</b>	<b>Country</b>	<b>City</b>	<b>Sector</b>
17			Sweden	Linköping	Academic
18			Sweden	Malmö	Private
19 Monika Baranowska	Project Leader	Internationella Kvinnoföreningen	Sweden	Malmö	Public Sector
20. Richard Hawkins	Professor	University of Calgary	Canada	Calgary	Academic
21. David Moorman	Senior Advisor, Policy and Planning	Canada Foundation for Innovation	Canada	Ottawa	Public Sector
22			Canada		Government
23. Adam Holbrook	Professor	Simon Fraser University	Canada	Vancouver	Academic
24. Catherine Murray	Professor	Simon Fraser University	Canada	Vancouver	Academic
25			Canada	Hamilton	Private Sector
26. Ron Neumann	Executive Director	Innovation Factory	Canada	Hamilton	Public Sector
27. Kim Allen	CEO	Engineers Canada	Canada	Ottawa	Public Sector
28. Mary Lou Maher	Chief Diversity Officer	KPMG	Canada	Toronto	Private Sector
29	Professor		Canada	Hamilton	Academic
30. Carolyn Reid	Business Development Consultant	City of Hamilton	Canada	Hamilton	Public Sector
31			Canada	Hamilton	Academic
32			Canada	Vancouver	Public Sector
33			Canada	Hamilton	Public Sector

Name	Title	Organization	Country	City	Sector
34. Dawn Bowdish	Assistant Professor	McMaster Immunology Research Centre	Canada	Hamilton	Academic
35. Lianne Stefurak	Executive Director	Centre for Surgical Invention and Innovation	Canada	Hamilton	Public Sector
36. Karen Behune Plunkett	President and CEO	WEtech Alliance	Canada	Windsor	Public Sector
37. Michael Keenan		OECD	France	Paris	Public Sector
38. Karen Wilson	Directorate for Science, Technology and Industry	OECD	France	Paris	Public Sector
39. Laudeline Auriol	Directorate for Science, Technology and Industry	OECD	France	Paris	Public Sector
40. Peter Jarrett	Head of Division Economics Department	OECD	France	Paris	Public Sector
41		OECD	France	Paris	Public Sector
42		OECD	France	Paris	Public Sector
43		OECD	France	Paris	Public Sector
44. Henry Etzkowitz	Professor Originator of the Triple Helix Concept	Stanford University			Academic

## **Appendix B: Email Recruitment Script**

Andrea Rowe, BA, MPA  
PhD Candidate-Department of Political Science

**E-mail Subject line:** McMaster Study - Women's Participation in National Innovation Systems

Dear \_\_\_\_\_,

My name is Andrea Rowe and I am a PhD candidate in comparative public policy at McMaster University in Hamilton, Ontario, Canada.

I am writing to request an interview with you for my PhD dissertation. I am carrying out a study to understand how innovation policies inform women's participation in national innovation systems in Canada and Sweden.

I am hoping to arrange an interview with you at your convenience. I will contact your office to arrange a convenient time and location for the interview and answer any additional questions you may have about my research. The interview will take no more than 45 minutes.

If you are able to participate in my study please respond to this email and will arrange a time to meet with you. I have attached a Letter of Consent for your review providing you with further information about my research and your participation in the study. I will bring a paper copy to our meeting for your signature.

If you have any questions please do not hesitate to contact me at [roweam2@mcmaster.ca](mailto:roweam2@mcmaster.ca) and I will be pleased to answer any questions you may have. I look forward to meeting with you.

Yours Sincerely,

Andrea Rowe  
Doctoral Candidate

Department of Political Science  
McMaster University  
Hamilton, Ontario, Canada  
**(905) 979-6859**

E-mail: [roweam2@mcmaster.ca](mailto:roweam2@mcmaster.ca)

This study has been reviewed and cleared by the McMaster Research Ethics Board. If you any have concerns or questions about your rights as a participant or about the way the study is being conducted you can contact:

The McMaster Research Ethics Board Secretariat  
Telephone: (905) 525-9140 ext. 23142  
c/o Research Office for Administration, Development and  
Support (ROADS)  
E-mail: [ethicsoffice@mcmaster.ca](mailto:ethicsoffice@mcmaster.ca)

## Appendix C: Letter of Consent

DATE: \_\_\_\_\_

### LETTER OF CONSENT

**Project Title: Overcoming obstacles to women's participation in national innovation systems: OECD innovation policy in Canada and Sweden**

#### Investigators:

**Student Investigator:**

Andrea Rowe, PhD Candidate  
Department of Political Science  
McMaster University  
Hamilton, Ontario, Canada  
(905) 979-6859

E-mail: [roweam2@mcmaster.ca](mailto:roweam2@mcmaster.ca)

**Faculty Supervisor:**

Dr. Ahmed Shafiquel Huque  
Department of Political Science  
McMaster University  
Hamilton, Ontario, Canada  
(905) 525-9140 ext. 23124

E-mail: [huqueas@mcmaster.ca](mailto:huqueas@mcmaster.ca)

#### Purpose of the Study

You are invited to take part in this study because of your expertise in the field of innovation. My research is in comparative public policy and I am carrying out this study to understand how innovation policy informs women's participation in national innovation systems. I want to examine how innovation norms formed internationally through the Organisation for Economic Cooperation and Development (OECD) translate into different innovation systems in Canada and Sweden. In addition, I would like to examine how women as scientists, entrepreneurs, innovators, and leaders make a unique contribution to the culture of innovation in two of the worlds most innovative economies.

The purpose of the study is to better understand the following:

- 1) How do Organisation for Economic Cooperation and Development (OECD) innovation norms influence the inclusion of women in innovation policy at the national level in Canada and Sweden?
- 2) Do existing theories of innovation explain women's experiences as Innovators and Entrepreneurs within National Innovation Systems?
- 3) How can the obstacles to women's full participation in national innovation systems be overcome?
- 4) Finally, what is the unique contribution that women's engagement in innovation policy can make to economic prosperity in a global knowledge economy?

#### What will happen during the study?

My research examines the participation of women in national innovation systems through both formal policy documents and informal interactions. The purpose of my interviews is to better understand the practical implications of innovation policy from the perspective of policy makers, leaders in the private sector, academics who study innovation, and leaders of organisations who

promote innovation. The interview will take no longer than 45 minutes and I will audio-record the interview, unless you request that I do not tape our conversation.

**Are there any risks to doing this study?**

The risks of taking part in this study are minimal, however like most social science research there are social risks associated with participating in this study. Given the relatively small number of people with expertise in the field of women innovation policy it is possible that through the knowledge you share with me other people may guess your identity. The information you share with me may affect your social status or reputation. There may be psychological risks such as emotional upset, embarrassment, or worry, if you experience any of these negative emotions you are free to withdraw from my research. I will do my best to mitigate these risks by keeping your name confidential.

Please feel free to ask me any questions you might have about my research at any time. You do not need to answer questions that you do not want to answer or that make you feel uncomfortable. As well you can withdraw (stop taking part) in my research at any time, until the end of April 2015 when my draft thesis dissertation will be submitted to the University.

**Are there any benefits to doing this study?**

This study is the first of its kind comparing the policy approach to women and innovation in Canada and Sweden within the context of the OECD. As a result of this your participation is very important. The findings from my research may help us to better understand how different innovation policies can contribute to more inclusive and competitive economies.

**Confidentiality**

Every effort will be made to protect your confidentiality and privacy I will not use your name or any information that would allow you to be identified. However, we are often identifiable through the stories we tell.

Since the community of experts in the field of women and innovation is relatively small, others may be able to identify you on the basis of references you make. Please keep this in mind in deciding what to tell me.

The information you provide will be kept in a locked cabinet in my office where only I will have access to it and Information kept on a computer will be protected by a password. Once the study is complete, an archive of the data, without identifying information, will be maintained for five years and then securely destroyed.

Your contribution to my research is extremely important and as an expert in the field of innovation I would be pleased to attribute your ideas and experiences to you and or your organisation if you would like to be recognised.

**What if I change my mind about being in the study?**

Your participation in this study is voluntary, If you decide to be part of the study, you can stop (withdraw), from the interview for whatever reason even after signing the consent form or part-way through the study.

If you decide to withdraw, there will be no consequences to you. In cases of withdrawal, any data you have provided will be destroyed unless you indicate otherwise. If you do not want to answer some of the questions you do not have to, but you can still be in the study.

You can withdraw from this study by contacting me by email or telephone until approximately April, 2015, when I expect to be submitting my draft thesis, dissertation.

### Information about the Study Results

I expect to have this study completed by approximately July of 2015. If you would like a brief summary of the results, please let me know how you would like it sent to you.

### Questions about the Study

If you have questions or need more information about the study itself, please contact me at:  
Andrea Rowe: Email: [roweam2@mcmaster.ca](mailto:roweam2@mcmaster.ca), Phone: 905-979-6859

This study has been reviewed by the McMaster University Research Ethics Board and received ethics clearance.

If you have concerns or questions about your rights as a participant or about the way the study is conducted, please contact:

McMaster Research Ethics Secretariat  
Telephone: (905) 525-9140 ext. 23142  
c/o Research Office for Administrative Development and Support  
E-mail: [ethicsoffice@mcmaster.ca](mailto:ethicsoffice@mcmaster.ca)

### CONSENT

- . I have read the information presented in the information letter about a study being conducted by Andrea Rowe, of McMaster University.
- . I have had the opportunity to ask questions about my involvement in this study and to receive additional details I requested.
- . I understand that if I agree to participate in this study, I may withdraw from the study at any time or up until approximately **April, 2015**.
- . I have been given a copy of this form.
- . I agree to participate in the study.

Signature: \_\_\_\_\_

Name of Participant (Printed) \_\_\_\_\_

Yes, I would like to receive a summary of the study's results.

Please send them to this email address \_\_\_\_\_

Or to this mailing address: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

... No, I do not want to receive a summary of the study's results.

I agree to be contacted about a follow-up interview, and understand that I can always decline the request.

... Yes. Please contact me at: \_\_\_\_\_

... No.

I would like to have my contribution attributed to me by referencing my:

Name YES or NO

Organization Yes or NO