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November 13, 2017

Knowledge Synthesis Report

How will Canadian technology clusters continue to thrive and remain competitive in managing STEM migration for innovation and growth?

Provincial Profile: British Columbia

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This research was supported by the Social Sciences and Humanities Research Council of Canada.

Social Sciences and Humanities Research Council of Canada
Conseil de recherches en sciences humaines du Canada
Canada

Canada's 'Innovation Agenda' and its provincial counterparts stress the importance of attracting and retaining skilled migrants, especially those with education and skills in science, technology, engineering, and mathematics (STEM) for innovation, growth and global competitiveness. Over the last few years, both federal and provincial governments have intensified their efforts to assist Canadian technology clusters in their recruitment and retention of foreign STEM talent.

This provincial profile on British Columbia examines current existing provincial migration policy programs, with the aim to foster a deeper understanding of the role that these programs play in attracting and retaining STEM migrant talent. It critically assesses the existing knowledge, while also identifying important gaps of knowledge.

We will consistently update this profile in the format of an 'evergreen' document, in which we will continue to incorporate new knowledge and findings to meet the needs of policy-makers, industrial stakeholders and other non-academic and academic audiences. The most recent version of this report can be downloaded from the project website www.migrationforinnovation.info

This profile supplements a recent Knowledge Synthesis Report on Canada and three additional profiles summarizing findings concerning the federal level and two other Canadian provinces and leaders in innovation and the recruitment of STEM migrant talent: Ontario and Quebec. All profiles and the Knowledge Synthesis Report are available from our project's website. Furthermore, to provide insights into global approaches and the strategies, successes, and shortcomings of Canada's foreign competitors in STEM recruitment, and in response to requests by stakeholders who were consulted before the beginning of this project, a selected number of foreign country profiles will be made available online.

We are grateful for the funding of this project, received from the Social Sciences and Humanities Research Council of Canada (SSHRC, Knowledge Synthesis Grant, 2017-2018, principal investigator: Dr. Martin Geiger).

The authors of this report also wish to acknowledge and thank the team members from the principal investigator's research collective 'Mobility & Politics' who assisted in the research for this report and its complementary country profiles (Farida Hassan, Fidan Karimli, Amanda Bergmann, Nora Chahine, Andrada Mihai, Erin Newman-Grigg, Jennifer Lee and Andreas Tibbles), as well as in the report's finalization and the dissemination of its findings to target audiences (Shayna Snucins-Earl, Nadia Springle and Risny Tan).

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For further information on this report and our research project, visit www.migrationforinnovation.info, join us on Twitter @migrateinnovate, or contact the principal investigator: Dr. Martin Geiger, Assistant Professor, Politics of Human Migration and Mobility, Carleton University, Department of Political Science and Institute of European, Russian and Eurasian Studies, D696 Loeb, 1125 Colonel By Drive, Ottawa, ON, K1S 5B6, martin.geiger@carleton.ca).

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Key messages

- **STEM talent is vitally important for continued economic growth in British Columbia (B.C.). STEM talent is locally scarce and demand continues to outpace local supply.**

  Over a million new job openings in the Science, Technology, Engineering and Mathematics (STEM) field are expected in B.C. by 2020. Yet the talent pool within the province is relatively constrained and the growth in demand will outpace the local supply of workers with STEM education and skills. Despite rapid business development across STEM sectors, leaders widely believe that the most significant challenge for their firms is accessing suitable talent. This mismatch between demand and supply of a highly-skilled STEM workforce highlights the need for programs that equip the local workforce with STEM skills through education and re-training, and the importance STEM migrant talent recruitment plays in the near future.

- **B.C. has placed great importance on the recruitment of STEM workers from both inside and outside the province. The Provincial Nominee Program (PNP) reflects a strong motivation to recruit in-demand immigrants. Yet, recruitment efforts are repeatedly constrained by federal government jurisdiction and regulations.**

  Stakeholders across the business community and provincial government want to ensure the long-term success of the STEM sector by expanding the local talent pool of skilled workers, as well as to improve the recruitment and retention of STEM migrant talent. However, the federal government maintains full jurisdiction over the total number (caps) of migrants allotted under all categories, and consistently only allows for approximately half the number of nominations requested by B.C.'s provincial government and industries.

- **Intricacies and inconsistencies between federal and provincial programs threaten to undermine recruitment and retention. The complexity of federalized immigration streams deters B.C. employers from hiring STEM migrant talent in the short term, while STEM migrants are deterred from seeking a career in B.C. in the long term.**

  B.C.'s experience with immigration across STEM fields highlights the growing complexity of highly skilled economic immigration in Canada, as both the federal and provincial governments have the tendency to create new program streams to provide quick short-term fixes to labour market demands. This causes confusion among stakeholders, increasing the likelihood that existing programs are not used effectively or appropriately. Employers express frustration at the ever-changing compliance requirements and feel that the risk is often not worth the reward when faced with high scrutiny as the subject of federal audits.

- **Lack of comprehensive data inhibits evaluation and more effective policy-making.**

  Mismatches between federal and provincial government investment into STEM sectors, as well as the cap on skilled labour supply, continue to hinder effective policy-making and implementation. There is a lack of labour demand data at the federal and provincial levels and a lack of knowledge about how provincial and federal immigration streams may duplicate, overlap, or unknowingly compete with one another for in-demand workers. In occupations in innovative sectors such as computer science, job categories are often new, rapidly stratifying, and outside the scope of the National Occupational Category (NOC code) classification system, leading to misunderstandings between applicants and case officers, resulting often in the denial of applications.

British Columbia (Canada)

1) Economic basis and provincial STEM sector

British Columbia's Science, Technology, Engineering and Management (STEM) sector has seen considerable growth in the past several years. While the province ranks third, behind Quebec and Ontario in generated technology sector revenue, revenue growth in British Columbia (B.C.) is on the rise (KPMG, 2016). Growing by a compound annual growth rate (CAGR) of 6% over a 10-year period ending in 2014, B.C.'s STEM sector revenue growth has outpaced STEM sector revenue growth in Ontario and Quebec (BC Tech Strategy, 2017). The innovation and technology sector in B.C. is a major growth driver of the provincial economy, generating $81.6 million in annual revenues (Hunter, 2017). As of February 2017, technology and manufacturing surpassed top-earning and traditional industries, such as pipeline construction, mining, and liquefied natural gas, as the fastest growing sectors in British Columbia. Innovation and technology sectors employ more than 100,000 workers (4.9% of B.C.'s workforce). Wages in this sector are 75% higher than the provincial average wage (Work BC, 2016).

The B.C. 2025 Labour Market Outlook Report (Work BC, 2016) projects that over a million new job openings are expected in the province by 2020, and that the growth in the demand for labour will outpace the growth and supply of workers with education and skills in STEM fields. These estimates even account for the projected, recent, and future graduates with STEM degrees and also account for the (re)training of domestic unemployed workers to work in STEM occupations. Thus, sectors employing graduates and workers with degrees and skills in STEM fields are likely to rely strongly on migrant talent in the future (Work BC, 2016).

To increase the global competitiveness of B.C.'s STEM sectors, the Canadian federal and British Columbia's provincial governments have made considerable investments into Research and Development (R&D) initiatives. Annual R&D expenditures for B.C. since 2008 remained consistently at a very high level of around $3 billion per year (BC Tech Strategy, 2017). In 2016, the provincial government released the B.C. Tech Strategy (BC Tech Strategy, 2017) report, a key component to the B.C. Jobs Plan (BC Jobs Plan, 2017). This strategy details a set of long-term goals to keep British Columbia's economy "diverse, strong and growing" (BC Jobs Plan, 2017). A major pillar of these long-term goals included large investments, such as the B.C. Tech Fund valued at $100 million, that will support growth of innovation and technology clusters through targeted investments in companies at the so-called 'series A stage' (BC Tech Fund Kensington Portfolio, 2017). The Canadian federal government is making similar investments through the Strategic Innovation Fund (Canada Strategic Innovation Fund, 2017), a $1.26-billion investment in Canadian innovation industries. $800 million of which are provided for B.C. and the province's further development of technology clusters (BC Tech Strategy, 2017). To make this funding efficient, it is imperative to ensure that the local labour market can successfully recruit and retain skilled foreign nationals in the key STEM industries to meet expressed labour needs.

Key STEM industries in British Columbia include Clean Technology, Wireless & Information Communication Technology (ICT), Health & Life Sciences, Digital Entertainment & Interactive (DE&I), Engineering, and other lesser-developed sub-sectors of services (Vancouver Economic Commission, 2012). Vancouver has quickly become known as a world-wide clean technology hub, with one-fifth of all Canadian Clean Technology companies located in Vancouver (Vancouver Economic Commission, 2016). Despite varying developments across STEM sectors, interviews conducted by private consulting firm Klynveld Peat Marwick Goerdeler (KPMG) in 2016 demonstrated that technology-sector leaders widely

believe that the most significant challenge the firms are facing is access to talent, including STEM talent (KPMG, 2016).

The talent pool within the province is relatively constrained and companies sometimes are even forced to establish part of their operations outside of the province where talent is more available. The 2016 TechTalent B.C. Report notes that the rapid expansion of the B.C. tech sector will result in an additional demand of more than 47,000 workers by 2021 (BC Tech Association, 2016). Currently, unmet demand in the B.C. tech sector amounts to 30,500 (23,400 skilled STEM field workers and 7,100 non-technology related jobs (BC Tech Association, 2016). Projections suggest that 12,500 more graduates from British Columbia's post-secondary institutions will be needed by 2021. In addition, 8,500 more immigrants than currently projected to arrive by 2021 will be needed to meet provincial labour demand (BC Tech Association, 2016).

The Information and Communications Technology Council's Labour Market Outlook 2015-2019 (ICTC, 2015) reported that due to employment growth, combined with replacement demand due to skills mismatch, retirements, and other exits, British Columbia would need to fill positions for the following:

Employment Gap by Categorical Occupations	NOC Code Skill Level[1]
1,180 computer and network operators and web technicians	2281-0213/0-B[2]
700 Telecommunication carrier managers*	0211/A
1,120 Engineering Managers*	0212/A
1,380 computer and information systems managers	0213/0
4,050 Computer and Information Systems Managers*	0213/A
120 Physicists and Astronomers*	2111/A
360 Chemists*	2112/A
1,300 Biologists and related scientists*	2121/A
3,200 civil engineers*	2131/A
2,000 electrical and electronics engineers*	2133/A
3,160 Chemical Engineers*	2134/A
420 Industrial and Manufacturing Engineers*	2141/A
100 Metallurgical and Materials Engineers*	2142/A
440 Mining Engineers*	2143/A
290 Geological Engineers*	2144/A
90 Petroleum Engineers*	2145/A
100 Aerospace Engineers[3]*	2146/A
1,380 Computer Engineers (except software engineers and designers)*	2147/A
1,900 medical engineers* (no specific NOC code, therefore under other professional engineers)	2148/A
390 Other Professional Engineers*	2148/A
1,220 information systems analysts and consultants	2171/A
1,750 database analysts and data administrators	2172/A
2,330 software engineers and designers	2173/A
4,430 computer programmers and interactive media developers	2174/A
2,590 Web designers and developers	2175/A
1,020 electrical and electronics engineering technologists and technicians	2241/B
2,020 user support technicians	2282/B
1,380 graphic designers and illustrators	5241/B

Table 1: Employment Gap by Categorical Occupations and Associated NOC Code and Skill Level (source: Work BC, 2016)
*Denoted occupations retrieved from ICTC, 2015. Data does not account for projected STEM graduates and reskilling programs.

[1] Information based on the National Occupational Classification (NOC) database, http://www.cic.gc.ca/english/immigrate/skilled/noc.asp#find.
[2] These occupations do not confine to NOC Codes (possible matches: Computer Network Technicians (2281/Skill B) or Computer and information systems managers (0213/Skill 0).
[3] There is currently limited industry-level data available regarding the talent requirements for the aerospace industry in B.C. and the degree to which requirements are currently being met (Aerospace Industries Association of Canada, 2016).

Industries requiring STEM workers in British Columbia have clustered into sub-regions, concentrated mostly in the areas of Vancouver, Okanagan, Nanaimo (Vancouver Island), Prince George (Northern B.C.) and Victoria (Mainland/Southwest) (Vancouver Economic Commission, 2016).

Sub Region	Sector	Top Projected Annual Average Employment Demand Growth
Vancouver Island/Coast	Computer Systems Design and related services	3.1%
Mainland/Southwest	Technical and Coordinating occupations in motion pictures, broadcasting and performing arts	3.6%
	Audio and video recording technicians	3.1%
	Web designers and developers	3.0%
	Telecommunications carrier managers	2.9%
	Computer programmers and interactive media developers	2.8%
	Computer systems design and related services	3.8%
	Telecommunications	3.1%
North (Cariboo, Northeast, North Coast and Nechako)	(No STEM occupations in demand)	
South East (Thompson-Okanagan and Kootenay) *	(No STEM occupations in demand)	

Table 2: Work B.C. Regional Breakdowns by In-Demand Sectors and Projected Annual Average Employment (Work BC, 2016)

Among these clusters, the Okanagan region has been one of the more proactive regional technology incubators, employing 3,700 people and generating $1 billion of revenues annually. Accelerate Okanagan (Accelerate Okanagan, 2017), a partner of the British Columbia Innovation Council (British Columbia Innovation Council, 2017), released an impact report and noted the creation of more than 650 new jobs since 2013 (BC Tech Strategy, 2017). Meanwhile, in Nanaimo, credit for sector incubation was provided to STEM stakeholders partnering with First Nations communities through targeted community technology training programs. These were established to develop local STEM talent that is also perceived as less likely to migrate to other municipalities, provinces or countries (Vancouver Economic Commission, 2016). Programs such as this have potential and warrant further exploration but may be outside the scope of this knowledge synthesis.

While the characteristics across regions and sub-regions show similarities, such as their rates of employment demand growth in STEM sectors *(table 2)* ever-present is a strong rural/urban divide. Many rural localities conflict with Vancouver and other more populated regions across British Columbia, resisting to be or to become passive recipients of Vancouver-developed innovations or policies (British Columbia Academic Health Sciences Network, 2017). Rural communities have expressed concerns that their region is experiencing talent loss, with students, innovators and small and medium-sized enterprises (SMEs) getting started but then moving to more popular regions for better access to markets, infrastructure and talent (Vancouver Economic Commission, 2016).

Approximately 90% of immigrants who come to British Columbia choose to live in its southwest coast. Proposals to increase new immigrant arrivals to more rural areas have cropped up, suggesting provincial and federal governments experiment with offering generous social housing and welfare rates to recent immigrants and refugees willing to move to smaller, more northern localities. (Vancouver Sun, 2017). This, however, does not account for the employment opportunities in highly skilled sectors, such as STEM sectors, if they were to settle in less populated areas. Such propositions stress the need for a more holistic view of rural development and the labour demand that needs to exist for immigrants to experience successful labour market integration.

Stakeholders across the business community and provincial government are strongly interested in ensuring the long-term success of the sector by expanding the local talent pool. They hope to accomplish

this through improved post-secondary degree programs and the attraction of foreign talent. Attracting foreign talent, however, requires a faster and more responsive immigration process that suit the short term and long-term labour market needs, thus ensuring global business competitiveness (BC Tech Association, 2016). Reducing federal restrictions placed on provincial immigration regime for skilled workers in the STEM sectors would allow for the province to capitalize on large amounts of public funding for R&D. In addition, reported labor projections in STEM sectors suggests that an immediate liberalization of migration for STEM foreign national workers to British Columbia would promote stronger business growth, increased global competitiveness of B.C. industries, and would also lead to the creation of jobs outside STEM fields (BC Tech Association, 2016).

2) The STEM workforce in B.C.

B.C.'s STEM labour force is generated from and draws on the following pools: graduates from post-secondary institutions (usually referred to as 'new entrants' to the labour market), highly skilled STEM immigrants (those arriving with skills in their occupation) from outside Canada, and landed immigrants; and local supply of STEM workers, who, through acquisition of and/or re-qualification in STEM skills, transition into in-demand occupations in the STEM sector. The technology sector relies on these labour force sources, as well as inter-provincial migration. Unfortunately, no statistics are readily available on the prevalence of cross-provincial 'poaching' of talent.

The provincial government supports each of these pools or STEM 'pathways'. To promote locally-grown talent, B.C. has begun investing in 'career transition pathways'. Career transition pathways are programs that aim to provide local workers with training preparation and programs, such as the Canada-B.C. Job Grant (Work BC, 2017), to allow for new, local talent to enter the STEM fields (Provincial Government of British Columbia Education and Training, 2017). Similarly, programs for targeted immigration also exist and aim to assist new arrivals to B.C. by combatting issues such as de-skilling and skills mismatch among immigrant cohorts (Skuterud & Su, 2012).

Examples of these programs include the Skills Connect for Immigrants Program (BC Skills Connect for Immigrants Program, 2017), which aims to help skilled immigrants move quickly into jobs that match their qualifications; and IMPACT (Immigrant Pathways to Alternative Careers in Technology), which assists provincial newcomers in matching their skill sets with occupations in the technology sector, and helps employers hire newcomers with in-demand skills for technical jobs (Immigrant Services Society of BC, 2017). These efforts highlight that deskilling and skills mismatch among both skilled and unskilled immigrants is a problem but one which we have little quantitative data about. No record exists of the frequency of when immigrants are not considered for positions based on skills gaps or the inability to meet specific accreditation requirements, even when they have the skills and education necessary for the position. This may be especially prevalent among highly skilled workers looking to enter into STEM occupations in Canada and those looking to enter into highly-regulated professions such as engineering or medicine.

Existing studies show that in Canada, the proportion of immigrants is higher among science graduates: in 2011, 51% of all STEM degrees earned in Canada were held by immigrants, including international students, temporary foreign workers, or (recent) permanent residents (Dionne-Simard, 2016). Most of the Provincial Nominees (85.7%) in B.C. between 2005-2009 had completed post-secondary education in Canada and 51.1% of them had a bachelor's degree, a Master's Degree or a Doctorate. Nearly 80% of these applicants intended to work in occupations requiring at least NOC B, A, or O skill

levels which include STEM occupations in skilled occupational categories (i.e. categories requiring a Bachelor's degree or higher education, or commensurate work experience). This shows that, not only are foreign national students are a substantial contribution to the growing STEM labour force in Canada, providing the skills and education necessary to meet a portion of the labour demand expressed across STEM sectors. These students also utilize the B.C. PNP to work and stay in Canada. However, this may not be to the exclusion of foreign-educated STEM field workers, for whom there is little quantitative data on the economic immigration pathways they use or the level of discrimination they may face in the labour market for not having an easily recognizable, Canadian educational background or Canadian work experience (Bauder, 2003).

Spotlight: Recent graduates from Canadian post-secondary institutions – Retention of STEM talent

Recent graduates from post-secondary institutions in Canada include both international as well as local (domestic) students. British Columbia's Provincial Nominee Program (PNP) actively recruits foreign students through two programs: Skills Immigration – International Graduate Category, and Skills Immigration – International Post-Graduate Category (The BC Provincial Program, 2017), as part of an 'integrated offer' system. The integrated offer system links public post-secondary education with immigration programs, effectively creating for students a pathway to permanent residence and ultimately, citizenship (Seidle, 2013). These integrations over time have made post-secondary institutions a critical component of British Columbia's talent retention and immigration policy (Wylie & Campbell, 2017). Both programs provide specific advantages compared to other skilled labour programs of the B.C. Provincial Nominee Program (PNP), as they do not require extensive years of on-the-job experience to qualify for immigration status. Through the integrated offer system, the province may be able to capitalize on investments made through the financing of international students within Canada. These skilled immigrant workers in STEM fields may also be more adaptable to British Columbia's labour market, due to their years of education and internships with Canadian employers.

In 2015, the number of student applications received in Canada was 187,968, a 6.4% increase compared to 2014. Immigration, Refugees and Citizenship Canada (IRCC) issued 125,783 new study permits for international students, a 5.4% increase from 2014 (IRCC, 2017). Though our understanding is that international students in Canada are utilizing B.C. PNP immigration streams to remain in Canada, we do not have statistics regarding British Columbia's share of Canada's total (student) immigration, either inside or outside British Columbia's Provincial Nominee Program due to the nascence of these immigration streams. In addition, a total of 5,829 international study permit holders transitioned to permanent residence through economic streams (IRCC, 2017). Retaining international students holding STEM degrees is one of the objectives of the provincial government's agenda on technology, which also aims to expand the existing local STEM talent pool. However, there is no data available about who makes the transition from being an international student to a STEM immigrant worker in British Columbia.

The British Columbia 2025 Labour Market Outlook Report (Work BC, 2016) states that over 1 million new job openings are expected in the province by 2020 and the growth in the demand for labour will outpace growth in the supply of workers. Thus, STEM occupations will rely on migrants for new labour supply to fill the gap (BC Chamber of Commerce, 2014). The addition of the 'integrated offer' system provides students with direct avenues to permanent residency through the B.C. PNP. To achieve a greater number of Canadian educated skilled workers, the provincial government has been advocating that the federal government lift the cap on the number of Provincial Nominees, allowing for greater provincial

control over the program to meet short term labour needs, as well as to boost provincial retention of skilled workers. More data on international STEM talent moving through the integrated offer process would be of great use to the provincial government moving forward.

Research by Green & Green (1999) and Zhang (2013) suggests that the British Columbia PNP has traditionally been more successful than federal immigration programs in attracting and retaining international skilled workers for several reasons. The first and most apparent is that the B.C. PNP caters to the experiences of international students studying in Canada and reduces barriers to allow them access to the labour market. British Columbia's relative success in international student retention may also be in part due to higher wages: Studies of wage earnings in the B.C. PNP and those Federal Skilled Workers (FSWs) residing in British Columbia show that the mean employment earnings of B.C. provincial nominees are three times higher than FSWs after 1 year from initial entry into the provincial skilled labour market (Zhang, 2012).

3) History of STEM migrant talent recruitment

British Columbia's economic immigration programs have become increasingly stratified and targeted since 2009. Prior to this, immigration to British Columbia was synonymous with federal immigration, as Canada controlled and stipulated all requirements and programs. Now, Canadian immigration is a matter of shared federal-provincial jurisdiction; however, federal law prevails over provincial law in matters where the federal government and provincial government disagree (Baglay & Nakache, 2013). Green & Green (2004) frame the goals of Canadian federal immigration policy as *"an ongoing battle between proponents of using immigration for long term (economic growth and demographic) goals and proponents of using it for short term (current labour market) goals"* (Green & Green, 2004).

Whereas the Federal Skilled Worker Program (FSWP)[4] and Foreign Skilled Worker Program are widely agreed to take a broader, longer-term perspective on desirable human capital traits via the Points System[5] the federal Canadian Experience Class (CEC)[6] and Provincial Nominee Programs (PNP) programs are thought to be targeted to address short-term occupational skills shortages as well as retention (PNP) (Baglay & Nakache, 2013). Provincial Nominee candidates are decided on a bilateral basis between the federal government and each province: in British Columbia's PNP, the province has explicit jurisdiction over the labour market selection criteria of foreign workers. While this dynamic has been repetitive throughout the Canadian immigration regime since decades, researchers note that federal programs such as the Federal Skilled Worker Program (FSWP)[7] tend to favour the long-term approach while the British Columbia Provincial Nominee Program (B.C. PNP or simply PNP)[8], Temporary Foreign

[4] The Federal Skilled Worker Program (FSWP) is for individuals selected to immigrate to Canada based on their work experience and skills. As of January 2015, candidates for the FSWP are selected through the Express Entry System, a pool of candidates interested in immigrating to Canada selected based on their skills, education, language ability, and work experience (Citizenship and Immigration Canada, Express Entry System, 2017).

[5] The process of establishing 'levels' throughout this research refers to the process by which the federal government stratifies skilled and unskilled workers.

[6] The Canadian Experience Class (CEC) is a permanent resident category for individuals with skilled work experience in Canada. It was developed for temporary foreign workers and foreign graduates with qualifying Canadian work experience. (Citizenship and Immigration Canada, Canadian Experience Class, 2017).

[7] The Federal Skilled Worker Program (FSWP) was developed as part of Canada's immigration strategy, wherein permanent residents are selected based on their ability to become economically established in Canada. Applicants who wish to come to Canada under the FSWP are adjudicated under the following six selection factors: (i) work experience, (ii) education, (iii) language, (iv) age, (v) arranged employment and (vi) adaptability elements. (Citizenship and Immigration Canada, 2017).

[8] British Columbia's Provincial Nominee Program (BC PNP) is administered in partnership with the federal government in accordance with the 2015 Canada-British Columbia Immigration Agreement (CBCIA). The Government of Canada allocates a limited number of Nominations each year to British Columbia.

Worker Program (TFWP)[9] and Express Entry[10] aim to fill short-term labour demands (Baglay & Nakache, 2013).

A concern with the 'absorptive capacity' of the economy has affected immigration levels as well, with alternating periods of large inflows targeted at specific economic goals and periods of drastic cutbacks in numbers during economic downturns. Levels planning, the process of constructing points-based criteria to accept more migrants based on cultural and labour market integration, based on absorptive capacity of the labour market was abolished in the 1990s and now the practice is to determine points-based requirements according to the health of the economy and its ability to accommodate more workers (Baglay & Nakache, 2013).

In the mid-1980s, the B.C. economy just began to recover from the worst recession it had experienced since the 1930s. With growth in mind, economic-class immigrants were given greater priority in both federal and provincial skilled worker programs (the ratio of these to the total increased from 32% in 1985 to 50% in 1988, and, after a brief decline, to 56% in 1996) (Baglay & Nakache, 2013). Over the same period, the proportion of economic migrants jumped from 27% to 67%, with the ratio of entrepreneurs, investors and their dependents peaking at 52% in 1992. Within this class, entrepreneurial and investor immigrants were given their own preferential categories. By the early 1990s, a quarter of all economic immigrants *"were either principal applicants to the business programs or their dependents"* (Baglay & Nakache, 2013). While these are federal figures, this study found no definitive, equivalent statistics for British Columbia alone.

Between 1990 and 1996, over half of all investor immigrants[11] arriving in Canada indicated on their landing forms that they intended to settle in British Columbia, and the majority ended up specifically in the Greater Vancouver Area. Between 1995 and 2008, over 80% of new arrivals settled in British Columbia, Ontario, Quebec and their major cities (Hiebert, 1999). The statutory basis for provincial involvement in immigration selection stems from the 1976 *Immigration Act*, allowing the minister to *"enter into an agreement with any province [...] for the purpose of facilitating the formulation, coordination and implementation of immigration policies and programs"* (Seidle, 2013). According to Citizenship and Immigration Canada in 2011, the PNP was introduced in 1998 to give provinces a mechanism to better respond to local (provincial) labour demands (Citizenship and Immigration Canada, 2011). Under this agreement, B.C. PNP could form, and British Columbia was given authority for the selection of migrants it wished to welcome under the program. Prior to this, skilled workers in British Columbia only had the FSWP (CIC, 2011).

Since 2008, Canada has been amending its immigration policies to better prioritize more specific categories of economic-class immigrants. In doing so, an increased reliance has been placed on the National Occupational Classification (NOC) system, and more emphasis placed on reducing processing times for economic class applications (Albiom & Cohl, 2012). Policy changes to PNPs across Canada that brought about greater regulation by the federal government in 2009 led to significant tensions between

[9] The Temporary Foreign Worker Program (TFWP) allows Canadian employers to hire foreign nationals to fill temporary labour and skill shortages when qualified Canadian citizens or permanent residents are not available (Citizenship and Immigration Canada, Fact Sheet – Temporary Foreign Worker Program, 2017).
[10] Through the Express Entry System, provinces and territories can find and nominate candidates in the Express Entry pool under their Provincial Nominee Program where applicable (Citizenship and Immigration Canada, *Express Entry System*, 2017).
[11] The Immigrant Investor Program (IIP) aims to have experienced business people contribute to Canada's growth and long-term prosperity by investing in Canada's economy. Investors must (a) show that they have business experience, (b) have a net worth of at least C$1,600,000 that was gained legally, and (c) invest at least C$800,000. The benchmarks for the program have changed over the lifetime of the program and continue to be tailored based on CIC's standards. (Citizenship and Immigration Canada, *Investors*, 2017). British Columbia also manages its own Entrepreneur Immigration Category under *B.C. PNP*, for those who want to immigrate to BC and will invest in and actively manage a valid business. (British Columbia, *Entrepreneur Immigration Program Guide*, 2017). Provincial investor programs are regarded with high levels of scrutiny by the federal government, as instances of inadequate applications of eligibility and admissibility requirements and fraud, came to a head in 2009 (Seidle, 2013).

British Columbia and the federal ministry of Citizenship and Immigration Canada (CIC), exhibiting considerable divergence over the limits on the number of nominees each provincial government may accept, as well as minimum language requirements for candidates. The 2009 Provincial Nomination limits from the federal government came as a direct result of cases of fraud in business investor programs and PNP growth surpassing the FSWP, as the federal government was concerned that PNPs were acting as an alternative to the FSWP and other federal immigration pathways (Seidle, 2013). PNP agreements require provinces and territories to collect information on the nominees, however in 2009 the Auditor General of Canada reported that there was a lack of information on Provincial Nominee application outcomes and noted that the information was either absent or incomplete and not always shared (Office of the Auditor General of Canada, 2009). This affected the evaluation of the efficiency of the PNP for specific provinces and streams which also puts limitations for making conclusions within STEM recruitment context in British Columbia (CIC, 2011).

According to the 2012 figures from CIC, economic immigrants received about 60% of permanent resident visas, the majority of which were awarded under the FSWP and B.C. PNP (CIC, 2012). In 2012, British Columbia's Immigration Task Force urged to increase immigration levels of skilled and semi-skilled workers as immigration levels were insufficient to meet the needs of the province (British Columbia Immigration Task Force, 2013). By 2013, the annual nomination limit for the B.C. PNP increased to only 3,800 compared to 3,000 in 2009 (Seidle, 2013). Research in 2013 also showed that retention rates for immigrants through PNPs were higher in most provinces than for economic class migrants arriving through federal programs such as the FSWP (Pandey & Townsend, 2013).

In addition to disagreeing about numbers, the federal and provincial governments also disagreed about timelines: whereas the federal government considered processing timelines for applications satisfactory, the provincial stakeholders argued otherwise (Hunter, 2017). In response, in 2012 the B.C. Immigration Task Force and Chamber of Commerce recommended the development of a *"fast lane"* (Pandey & Townsend, 2013) option for employers, which would allow the industries a faster access to international talent sponsored under the federally-run Temporary Foreign Worker Program and PNPs. In 2014, B.C.'s Chamber of Commerce also recommended to advocate for higher annual nominations as well as facilitating certain industry groups to request special responses from the B.C. PNP to targeted labour market needs such as shorter processing times (BC Chamber of Commerce, 2014).

In 2011, British Columbia had 4,306 PNP admissions, accounting for only 12.4% of total immigration to the province. In 2015, the federal government reasserted control over Provincial Nominee Programs after federal immigration changes led to overwhelming applications, disagreements over eligibility requirements, and instances of fraud (Seidle, 2013). New rules enacted after the lifting of the suspension introduced points-based criteria to the B.C. PNP, allotting points for applicants' education, experience, language ability, a job offer in British Columbia and the extent to which that job/occupation fills a high-priority gap in the labour market. By 2017, the Provincial Government of British Columbia requested that the PNP cap be increased from 6,000 (2016) to 9,000 (2017), but this request was denied and remained steady at 6,000 (Hunter, 2017). The federal government's practice of consistently issuing British Columbia approximately half of its requested PNP allotments has fueled tension between provincial and federal authorities and highlights the differing views of labour market capacity for skilled workers.

Annual Nomination Limits	2009: 3,000	2010: 3,500	2011: 3,500	2012: 3,500	2013: 3,800	2014/2015: (suspended)	2016: 6,000	2017: 6,000

Table 2: British Columbia's Annual PNP Nomination Limits (source: Seidle, 2013; Hunter, 2017)

According to the Citizenship and Immigration Canada (CIC) 2020 'Evaluation of the Federal Skilled Worker Program' (CIC, 2010), most provincial governments, including British Columbia, prefer the PNP due to its perceived responsiveness about provincial priorities and needs (CIC, 2010). Provinces also expressed disappointment with the processing times in the Federal Skilled Worker Program (Baglay & Nakache, 2013). Finally, despite national increases across all categorical work designations, British Columbia's proportional share of national economic immigration through FSWP dropped from 19% to 14% between 2005 and 2011. This could be explained by the federal government's decision to decrease admissions of FSWP as the B.C. PNP has expanded in recent years, to ensure CIC adheres to the annual levels plan (Citizenship and Immigration Canada, 2010). Provincial stakeholders and government indicated that the FSWP did not meet the province's labour market needs as the applicants did not necessarily settle in their provinces where the labour was needed. In this period admissions through the FSWP declined from 21,810 to 10,028, while admission through the B.C. PNP streams increased from 798 to 4,303 (British Columbia Minister of State for Multiculturalism, 2012). However, new insights into this matter are necessary given the tremendous overhaul that the federal system underwent with the introduction of the Express Entry management system and the reformulation of the FSWP and CEC class requirements. The 2009 overhaul of the TFWP compounded existing barriers for employers, with all sub-sectors reporting difficulties with the TFWP and its LMIA requirements, as well as the lack of access to the B.C. PNP, as applicants turned away from federal immigration pathways in favour of provincial ones (Vancouver Economic Commission, 2016).

The current 'Canada-British Columbia Immigration Agreement' is valid from April 7, 2015, to April 6, 2020 (IRCC, 2016). Under this current agreement, British Columbia is responsible for the design of PNPs; establishing program requirements; recruiting and nominating the immigrants who will come to the province; and monitoring, evaluating and reporting on PNPs. The main objectives of the B.C. PNP are (1) to increase the economic benefits of immigration to provinces/territories based on their economic priorities and labour market condition, (2) to distribute the benefits of immigration across all provinces, (3) to enhance federal-provincial-territorial collaboration, and (4) to encourage the development of official language minority communities (Seidle, 2013).

Strategic recruitment streams were recently developed as part of the B.C. PNP to further target specific occupations by using the NOC system as a guide to address long term needs of labour market (CIC, 2011). Applications were considered in five categories: Skilled Workers, Designated Health Professionals, recent international graduates from eligible Canadian post-secondary institutions, recent master's and doctorate graduates from a B.C. post-secondary institution in the natural, applied or health sciences, and entry-level or semi-skilled workers (British Columbia Minister of State for Multiculturalism, 2012). Applicants must have a job offer in eligible occupations, including STEM occupations (under Natural and Applied Science and Related Occupations), to qualify for the Skilled Worker category of the B.C. PNP. Half of all the applicants that landed in Canada between 2005 and 2009(49.2%) were nominated under the Skilled Worker stream of PNP (CIC, 2011).

Spotlight: Labour Market Opinions (LMOs) and Labour Market Impact Assessments (LMIAs)

Canadian employers who hire Temporary Foreign Workers must receive government permission in the form of a Labour Market Impact Assessment (LMIA)[12] (formerly the LMO). The LMO was a document issued by Human Resources and Skills Development Canada (HRSDC) stating that hiring the foreign worker will have a positive or neutral effect on the Canadian labour market (CIC News, 2013). In 2014, the LMO was replaced with the LMIA, a system whereby Temporary Foreign Worker determinations are based on wages rather than National Occupational Classification (NOC) (Canadian Immigration Forum, 2014). The LMIA determination of wage can have a lasting effect on the employee if the future sponsoring employer is unwilling to pay what many employers see as an inflated wage (Canadian Chamber of Commerce, 2016). As part of the LMIA application, companies are required to submit detailed transition plans on how the company will try to transition to hire more Canadian employees over time, or detail how their foreign workers will become Canadian permanent residents (Canadian Immigration Forum, 2014).

The LMIA process is more arduous than its predecessor, the LMO. The LMIA application is a lengthier process, requiring more detail[13] regarding the employer's attempts to recruit a Canadian skilled worker. According to Citizenship and Immigration Canada (CIC) a positive LMIA should demonstrate that there is need for a foreign worker to fill the job being applied for and that no Canadian worker is available to do the job (CIC, 2017). To do this, Canadian employers must run a separate recruitment process to evidence that there is a domestic labour shortage for that position. Recruitment details that must be submitted include a listing of the number of Canadians who applied for the job, the number of Canadians who were interviewed, and including detailed descriptions of why each interviewed Canadian was not accepted for the position (Canadian Immigration Forum, 2014).

From 2013 to 2014, there was a 40% drop in higher-skilled work permit holders and a 45% drop in positive Labour Market Impact Assessments (LMIAs), which are required for the issuance of both short and long-term work permits (Canadian Immigration Forum, 2014). For an immigrant worker to be hired under B.C. PNP, the worker would need to be issued a positive LMIA (also sometimes referred to as a confirmation letter). In the LMIA, the wage 'floor' is determined by the federal government based on the description of the occupation and proposed job duties set forth by the employer. For that immigrant candidate to be hired legally, the employer must pay at least that wage that is stipulated by the government (British Columbia Provincial Nominee Program, 2017). In 2015, B.C. worked with the digital media industry and Immigrants, Refugees and Citizenship Canada (IRCC) to modify the Temporary Foreign Worker Program (TFWP) recruitment process which would give the industry access to international technical skills through again more flexible procedures, like the previous LMO.

[12] A Labour Market Impact Assessment (LMIA) is a document that an employer in Canada may need before hiring a foreign worker. According to Citizenship and Immigration Canada (CIC) a positive LMIA will show that there is need for a foreign worker to fill the job being applied for. It will also show that no Canadian worker is available to do the job. A positive LMIA is also sometimes referred to a conformation letter. (CIC, "What is a Labour Market Impact Assessment?",2017). However, there is considerable speculation by scholars and stakeholders about the LMIA's ability to accurately test the labour market.

[13] Instead of using the National Occupational Classification to distinguish jobs as the LMO process did, the LMIA process is based on wages and employers are subject to different regulations and application processes based on the employees' categorization as high wage or low wage. Employers are also required to go into greater detail regarding the recruitment measures they take to confirm that no Canadian is available to perform the job. (Canadian Immigration Blog, *New LMIA Process Introduced to Replace LMOs,* 2014).

4) Stakeholder viewpoints and experiences

Stakeholders express a variety of concerns reflecting the points outlined in the previous sections. *"Employers face uncertainty and an inability to plan because of the LMIA's tedious process and a lack of timeliness. These hurdles combined with the shared industry experiences of dealing with lengthy audits (one of every four employers), has resulted in employers avoiding the LMIA process altogether."* (Vancouver Economic Commission, 2016). The Vancouver Economic Commission found that the FSWP rather than focusing on human capital characteristics for longer-term labour market integration of skilled immigrant workers, ended up suiting short term needs of the labour market due to the introduction of the LMIA into its process (Vancouver Economic Commission, 2016).

One of the more common barriers identified by British Columbian stakeholders are the reliance on LMIAs in general, including their increasing prevalence throughout federal immigration categories for skilled labour (such as the TFWP, FSWP). This has created one major rift between STEM companies' skilled labour demands and their ability to hire commensurate talent, because they are not able to complete or sustain the LMIAs necessary to hire the workers they need. In a survey conducted by the Canadian Employee Research Council in November 2015, 70% of major Canadian company respondents stated that changes to the LMIA process have had negative impacts on their ability to recruit skilled workers through federally skilled worker immigration pathways (Canadian Chamber of Commerce, 2016). At the Canadian Chamber of Commerce stakeholder meeting in 2016, similar grievances were noted among attendee companies. *"LMIA's cannot handle the analysis of the skills set in the marketplace,"* said one attending employer, *"You are asking people to assess LMIAs for traditional role when the actual role is very different"* (Canadian Chamber of Commerce, 2016). In another stakeholder consultation, Carl Dholandas Counsel at Baker and McKenzie LLP, contextualized LMIA, stating that the requirement, *"is a tool that is ill-suited to the selection of permanent residents because its logic is based on the protection of certain temporary jobs...it is not designed to measure long-term labour market demands. Express Entry and the Federal Skilled Worker Program are recruitment tools to add the best people for years to come"* (Canadian Chamber of Commerce, 2016).

More specifically and focusing on B.C., when a company in British Columbia wishes to employ a foreign national in a STEM skilled occupation, the NOC codes provided are not applicable to that position, as technology has outpaced the government's ability to reflect new occupations in the NOC code system. *"It's like a seek-and-search mission,"* stated Rohail Khan, President of Skills International, *"Employers cannot figure out a NOC code that an employee fits in, and that is the cause of a lot of mistakes"* (Comments taken from Canadian Chamber of Commerce, 2016) The NOC system of classifying occupations, significant requirements and criteria, have proven to be slow and complicated processes, placing tight restrictions on employers and workers alike, such as shortened work permit durations, which fails to support the needs of educational institutions and workers. Employers in British Columbia have voiced concerns over the categorization of specific NOCs where government can (and has) interpreted a candidate's NOC differently than an employer. Stakeholders shared that they had lost foreign candidates due to the difference of interpretation of the NOC by (now) Economic and Social Development Canada during the LMIA process, despite lengthy conversations, documentation and explanations (Vancouver Economic Commission, 2016). Some stakeholders, experienced on the use of NOCs in their petitions for foreign STEM talent, stated that it is impossible for the NOC system to keep pace with the increasingly stratified roles in innovative sectors, and that NOC codes should not be relied upon to derive meaningful data on which to build policy (Vancouver Economic Commission, 2016).

NOC code misclassifications can impact Canadian-educated international STEM talent as well. *"Current non-Canadian graduates require work permit sponsorship (requiring an LMIA) either as soon as they graduate or the end of their post study work permit period, and where this duration is 12 months or less they are unable to match their current minimum qualifying salary for their occupations. Graduates would require at least an additional 2 years of post-graduate experience to reach minimum required salaries for work permits [in certain areas of British Columbia]"* (Vancouver Economic Commission, 2016). Currently, the NOC system is causing perpetual issues, as a great deal of existing data and policy is built upon this framework, and the pervasiveness of this framework has largely dictated immigration and educational curriculum development (Vancouver Economic Commission, 2016).

The issue of outdated classification systems, such as NOC codes provided by the federal government, may be symptomatic of a broader lack of data and clear guidelines made available to employers and industry groups. *"To date, there have been longstanding difficulties with the statistics collected on the Technology Sector in part due to the pervasiveness of Technology jobs throughout all sectors"* (Canadian Chamber of Commerce, 2016) British Columbia's Academic Health Science Network (B.C. AHSN), reflected on their own sector's need as *"Stakeholders agreed that a successful B.C. AHSN is a "data-driven health system" which alleviates the stifled health care delivery, research, business development and innovation in B.C."* (BC Academic Health Sciences Network, 2017). The lack of knowledge of the prevalence or magnitude of STEM occupations in non-STEM sectors, and the greater integration of technology occupations in health and other sectors is under-researched in labour discussions and reported labour needs (Vancouver Economic Commission, 2016). In the Okanagan region, for example, there are a significant number of entrepreneurs who are self-employed and prove difficult to quantify in the larger discussion of the STEM industry, as they may not be accounted for by the provincial technology associations and larger advocacy groups (Vancouver Economic Commission, 2016).

The renewed #BCTECH Strategy (2017) stated that the work of data collection and dissemination of B.C. statistics has remained foundational to industry-wide understanding of *"the growth and needs of the technology industry as a whole"* and that *"sector data could be better used for the benefit of British Columbia* (Vancouver Economic Commission, 2016). *Today, the vision is to create a single, safe and trusted platform to make new discoveries with government data to create jobs"* (BC Tech Strategy, 2017). Similarly, the results from the stakeholders' briefing held by the Canadian Chamber of Commerce resulted in the formation of a 5th committee exclusively for Data Collection and Analysis/LMI, allowing for collaboration with pre-established subcommittees on what data needs need to be collected and imparted (Canadian Chamber of Commerce, 2016). While data is an important consideration, stakeholders also expressed trepidation that policymaker's implementation of data strategies will take time while companies suffer losses in the interim due to a lack of foreign STEM talent recruitment and retention. Stakeholders were keen on identifying short-term 'quick wins' that will assist in sector-by-sector buy-in and ongoing investment of time and expertise in crafting a new and better approach to STEM talent supply (Vancouver Economic Commission, 2016).

Other policy restrictions mentioned in the stakeholders' meetings included discussions of the policy Cumulative Duration, whereby a work permit cannot be issued when the individual has worked in Canada for one or more periods totaling four (4) years. This policy challenge has been stressed, to no fault of the employers or employees, by extensive delays in obtaining renewals of work permits and eligibility challenges in the application for Permanent Residency through Express Entry sub-sectors (Vancouver Economic Commission, 2016).

In response to consultations conducted by the Vancouver Economic Commission, Visier Workforce Analytics, an end-to-end, cloud-based application designed for HR professional to answer critical workforce strategy questions, reported, *"[Human Resource] leaders say that workforce planning is one of their highest priorities, yet one of their weakest abilities: 62% are still using manually produced spreadsheets despite facing dynamic, complicated planning problems"* (Vancouver Economic Commission, 2016). Federal, provincial and non-government stakeholders alike agree that improving the responsiveness between employers (labour demand) and post-secondary educational institutions (labour supply) is a necessary step towards provincial labour market efficiency and advancing the integrated offer system.

However, members of provincial STEM industry stakeholders expressed that programmatic changes may take too long (and therefore lose too much in opportunity cost) if they want the sector to maximize on public grants and expenditures in British Columbia's STEM industry. In other words, more immediate remedies to the STEM labour shortage in British Columbia are necessary for businesses to advance. British Columbia's Tech Industry Association's (BCTIA's) 2014 report 'Growing the Tech Sector – A Four Point Plan' points out that *"cooperative education is an underutilized tool, as many small companies fond the cost to recruit, train and support coop placements to be prohibitive. Although British Columbia already offers cooperative programs across twenty-three (23) post-secondary institutions with over 10,000 cooperative placements annually, the University of Waterloo alone reports over 16,000 cooperative placements annually…[and] many provinces across Canada have supported the growth of cooperative placements annually"* (Vancouver Economic Commission, 2016). Stakeholders also revealed *"overarching concern surrounding training and education, with most stakeholders suggesting that British Columbia educational institutions need to keep pace with industry needs"* and the awareness that different companies have differing capacities to develop in-house training programs to deal with a mismatch of skills. Improving the communication between industry and education, as well as developing innovative STEM education is key to a responsive labour ecosystem (Vancouver Economic Commission, 2016). One resolution to this issue may be to improve the ease, expediency and robust nature of the 'integrated offer' approach in British Columbia, allowing both larger companies and SMEs alike to benefit from a skilled STEM workforce.

In 2016 B.C.'s business community has been reporting that the government hasn't responded inadequately to the need for more skilled foreign workers (Vancouver Sun, 2016). As relayed by Ken Peacock, the Chief Economist for the Business Council for British Columbia*, "The target for economic class immigrants falls a little bit short of what we'd like to see. Our member companies continue to report a large level of difficulty hiring people, and an increasing need to look to overseas markets for top talent"* (Vancouver Sun, 2016). Over the course of the Vancouver Economic Committee's Stakeholder Engagement, it was noted by multiple stakeholders that systematic support of women, First Nations, youth and other is also necessary to support Technology Workforce Development. Increasing the number of women entering and staying in STEM occupations in British Columbia is important, as several stakeholders commented that the sector is missing half of the potential labour pool by not encouraging girls and women to go into STEM careers, and that this gap may be even larger estimating for the exclusion of First Nations and youth (Vancouver Economic Commission, 2016).

5) Conclusions and policy implications

Highly skilled economic immigration in Canada is growing increasingly complex, as both the federal and provincial governments have the tendency to create new program streams to fit short-term labour market demands. This causes confusion among stakeholders, increasing the likelihood that immigration streams are used inappropriately or are more generally misunderstood and age out of being relevant within short time. Rather than creating new program streams on top of program streams, the British Columbia profile shows that, firstly (1), there is first a strong need for more information allowing to gain a more comprehensive understanding of how highly skilled immigrants enter, work and are retained within high-demand STEM labour sectors; secondly (2), there is need for clarification and greater scrutiny as to what policies and procedures may be contributing to the deterrence or inability to retain highly skilled STEM labour, both across provinces and rural/urban divides; finally, thirdly (3), there is need to clarify what can be done to simplify and consolidate program streams that have become irrelevant or confusing to both highly skilled immigrants looking to settle in British Columbia, as well as the employers who wish to retain them, especially in the case of international students studying at B.C.'s universities.

Information Gaps

There are several disparate information gaps and a lack of follow-up by government bodies at the federal and provincial levels that inhibit further study of how multiple immigration streams are being utilized (or under- or not at all utilized) by employers and highly skilled immigrants across the STEM sectors. First, there is a mismatch between the federal and British Columbia's provincial government investment into STEM sectors and the cap on skilled labour supply they enforce (Work BC, 2016). Through labour data largely driven by stakeholder associations in STEM sectors of British Columbia, we see a large projected skills gap in the next ten years (Work BC, 2016). These projections tend to be corroborated by federal Statistics Canada projections, though federal labour statistics for the province are shown to be more conservative. Yet in certain sub-sectors in British Columbia, such as aerospace (Aerospace Industries Association of Canada, 2016) or health (BC Academic Health Science Network, 2017), there is still a lack of labour demand data. There is also a lack of knowledge about occupations in innovative sectors, which may be new, rapidly stratifying, and thus outside of the scope of National Occupational Category classifications (Baglay & Nakache, 2013). Research from the Vancouver Economic Commission also suggests that many companies and technology associations create 'internal' reports that may provide insight, but have not made these documents publicly available (Vancouver Economic Commission, 2016).

There is also a lack of data on how provincial and federal immigration streams may compete with one another for the same sought after highly skilled workers. For example, we do not have statistics regarding British Columbia's share of this immigration, either inside or outside B.C.'s PNP due to the nascence of these immigration streams and the lack of sophisticated reporting that is needed to better understand how highly skilled immigrants are notified about different immigration streams and how employers understand economic immigration reporting requirements and the auditing processes. Similarly, there is insufficient data and reporting to understand how international students use economic immigration streams, especially when there are replicated streams for recent graduate retention at both the federal and provincial levels. Though our understanding is that international students in Canada are utilizing B.C. PNP immigration streams to remain in Canada, we do not have statistics regarding British Columbia's share of Canada's total immigration, either inside or outside British Columbia's Provincial Nominee Program due to the nascence of these immigration streams.

Simply put, economic immigration in British Columbia is highly complex and confusing to study, as multi-layer functions of economic immigration streams and federal and provincial governments tendencies to come out with new program streams year after year, with little ability and resources to audit and collect data on how immigrants and employers use these streams make it nearly impossible to measure that immigration is suiting expressed labour market demand for highly skilled workers in the STEM sectors. While this may be difficult to investigate, one promising avenue for further research into barriers to highly skilled immigration may be to approach transnational firms regarding their experiences moving global talent across country borders. Their experiences with various federal, provincial and national economic immigration processes may shed light onto what they and their employees see as characteristics of highly skilled immigration processes that allow them to access the best talent.

Not only are we inhibited by limited data as to our understanding of how programs are being utilized by highly skilled immigrants, but we have even less of a basis for understanding how sought after foreign talent in the STEM sectors may be deterred from coming to British Columbia or Canada at large. No record exists of the frequency of when immigrants are not considered for positions based on skills gaps or the inability to meet specific accreditation requirements, even when they have the skills and education necessary for the position. This may be especially prevalent among highly skilled workers looking to enter STEM occupations in Canada and those looking to enter highly-regulated professions such as engineering or medicine.

Barriers Embedded in Policy and Procedures

There are several processes carried out in federal and provincial immigration streams that frustrate highly skilled immigrant workers and their employers in the STEM sector. Stakeholders cite major barriers in federal immigration procedures to reside in three two major elements; the LMO, LMIAs and NOC classification systems. Stakeholder responses from British Columbia reveal that employers have a harder time petitioning immigration officials to hire international employees outside of established NOC categories. In a growing number of cases, NOC classifications set forth by the federal government are unable to keep up with the pace of innovative sectors and the new job occupations they create (Canadian Chamber of Commerce, 2016). This often can lead to lengthened processing times, increased frustration and time commitment to immigration petitions by employers, if not rejection of what otherwise may be petitions with merit.

In discussions of how policy can alleviate barriers, a few suggestions of note arose in the research. Social and welfare accommodations to court highly skilled workers, while well intentioned, do not guarantee successful labour market integration of immigrants and foreign students studying in Canada, especially in high wage, highly skilled sectors, such as STEM sectors, if they were to settle in less populated areas. Such propositions stress the need for a more holistic view of rural development and the labour demand that needs to exist for immigrants to experience successful labour market integration. Rather, incentives for highly skilled workers in the STEM sector may be better addressed by reducing threats of de-skilling and improving accreditation of foreign experiences and credentials. Similarly, programs for targeted immigration also exist and aim to assist new arrivals to British Columbia by combatting issues such as de-skilling and skills mismatch among immigrant cohorts (Skuterud & Su, 2012).

Reducing federal restrictions placed on provincial immigration regime for skilled workers in the STEM field sectors would allow for the province to capitalize on large amounts of public funding for R&D. In addition, reported labor projections in STEM sectors suggests that an immediate liberalization of

migration for STEM foreign national workers to British Columbia would promote stronger business growth, increased global competitiveness of B.C. industries, and would also lead to the creation of jobs outside STEM fields (BC Tech Association, 2016).

Fostering a Better Understanding of Federalized Immigration for Employers and Highly Skilled Workers in the STEM Sector

The unique, federalized structure of British Columbia's skilled immigration processes can equally afford opportunity as well as confusion to STEM sector employers and potential STEM workers in the province. The ongoing institutional complexity of PNP's is such that skilled immigrants and their employers are unable to form reliable, long term expectations about eligibility requirements and the ongoing availability of program streams. While the B.C. PNP enjoys a high favourability rating among companies, the numerical limitations set upon by the federal government continues to be a point of frustration for the provincial government of British Columbia, STEM sector business associations and an aspiring skilled immigrant workforce. While the government made FSWP cap concessions in favour of the B.C. PNP rise in popularity among applicants, the inability to increase the cap overall in response to British Columbia's expressed labour shortage is causing unease among provincial companies.

Canada's decentralized approach to immigration, while effective at reducing processing times and granting flexibility to applicants in British Columbia, can often perpetuate complex, intersecting inequalities with detrimental consequences in terms of the policy in question, and, even more distressingly, with respect to the people involved. If this trend continues and perpetuates itself among skilled international STEM workers, this may serve to deter innovative, international talent from seeking opportunities in British Columbia in the future (Beach, Green & Worswick, 2011: 2).

While Canadian federalized immigration has long been framed in a bifurcation of short-term, immediate immigration versus long-term immigration extrapolated by Green & Green (1999; 2004), British Columbia stakeholders expressed the preference for elements that would deepen the channels of the integrated offer system for skilled workers in STEM sectors. The integrated offer system, while vital, complicates our understanding of who is an immigrant worker versus a non-immigrant worker over time and how that may increase or decrease the labour gap in British Columbia STEM. Our data management does not view immigrant labour as being part of a process, but rather puts the immigrant workforce into a separate 'buckets'.

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